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ABSTRACT

This descriptive study involving interviews with school district superintendents assesses the congruence to a School Facilities Construction Model by school districts participating in the 1983 to 1990 round of Ohio School Building Assistance Projects. Chapter 1 introduces a general background on the need for studying the amount of congruence to a construction model developed from school construction literature by districts that have participated in Ohio's School Building Assistance Program. Chapter 2 reviews the literature related to planning, designing, contracting, evaluating, occupying, and establishing a preventive maintenance program for a new school facility. Chapter 3 describes the research design and methodology used and the population and interview format. Chapter 4 presents a model which identifies the key components of a building program derived from the literature review. Chapter 5 presents the results of the research and an analysis of the findings. The final chapter discusses the significance and implications of this research for future Ohio superintendents about to begin a school building program and offers suggestions for further research. Appendices present the interview schedule, a list of the panel of experts and school building assistance districts and superintendents interviewed, study correspondence, and a summary of each interview. (GR)

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# The Development of a Model for a School Facilities Construction Program: Congruence of Building Programs Under the Ohio School Building Assistance Program with the Model

Philip E. Dubbs

Miami University
1992

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Reader

Graduate School Representative

## ABSTRACT

### DEVELOPMENT OF A MODEL FOR A SCHOOL FACILITIES CONSTRUCTION PROGRAM: CONGRUENCE OF BUILDING PROGRAMS UNDER THE OHIO SCHOOL BUILDING ASSISTANCE PROGRAM WITH THE MODEL

by Philip E. Dubbs

The purpose of this descriptive study was to assess congruence to a School Facilities Construction Model by school districts participating in the 1983 to 1990 round of Ohio School Building Assistance Projects. The School Facility Construction Model was developed after a school construction literature review was completed. Data was collected by interviewing each district's superintendent. The School Facilities Construction Model has eight components: (1) planning, (2) designing, (3) contracting, (4) construction, (5) equipping the facility, (6) occupancy, (7) post-construction evaluation, and (8) preventative maintenance program.

The methodology used was the interview method. An interview schedule was developed from the School Facility Construction Model. However, the unstructured interview technique also was utilized to clarify and extend the responses from the interview schedule. The population consisted of thirteen districts funded under Ohio's School Building Assistance Program from 1983 to 1990. All superintendents participated with the interviews.

These conclusions were established:

1. The planning process was out-of-congruence with the model in twelve districts.
2. Architect selection was out-of-congruence with the model in four districts.
3. The development of the educational specifications was out-of-congruence, especially in the area of developing the educational programs (curricular plan, instructional methods, support plans, etc.) with all districts.
4. All districts selecting a new site were incongruence.
5. Eight districts were out-of-congruence with the model while developing the schematic design.
6. Nine districts were out-of-congruence with the model during design development.
7. All districts were in congruence during ground breaking ceremonies.
8. All districts were in congruence in the areas of job meetings, change order review, review of payment requests, activation of the facilities, and development of the punch list.
9. All districts were in congruence by using acceptable methods of specifying equipment for the facility.
10. All thirteen districts' occupancy plans were in congruence.
11. Only six districts held post-construction

evaluations of the facilities, therefore seven districts were out-of-congruence.

12. Only one district is working on a preventative maintenance program that will place that district in congruence with the model.

# DEVELOPMENT OF A MODEL FOR A SCHOOL FACILITIES CONSTRUCTION PROGRAM: CONGRUENCE OF BUILDING PROGRAMS UNDER THE OHIO SCHOOL BUILDING ASSISTANCE PROGRAM WITH THE MODEL

A DISSERTATION

Submitted to the Faculty of
Miami University in partial
fulfillment of the requirements
for the degree of
Doctor of Education
Department of Educational Leadership

by

Philip E. Dubbs
Miami University
Oxford, Ohio
1992

Dissertation Director: Dr. Nelda McCabe

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Philip E. Dubbs

1992

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# CHAPTER I

## INTRODUCTION TO THE PROBLEM

Franklin (1991), reports that Ohio's State School Building Assistance Program was created in 1957 to assist school districts with low tax bases to finance expensive new building projects. Through 1989, the Ohio Legislature has appropriated $145 million and reappropriated $68 million from the Building Assistance Rotary Fund to 109 school districts. In January 1990, a new State School Building Assistance Fund priority list was developed tentatively approving $208 million in building requests for 43 school districts.

The approved projects normally range in cost from $2 million to $7.5 million. In the past, the typical district has been lightly populated and rural, including a large portion of Ohio's southeastern districts with assessed valuation ranging from $15 million to $50 million. Often, the superintendent is the sole central office administrator.

This $208 million tentative appropriation is only the tip of the iceberg evidenced by the 1990 Ohio Public School Facilities Survey (1990). This study identified new construction, remodeling, and major repair needs in Ohio's currently used K-12 public school buildings at $10 billion.

Castaldi (1982) characterized superintendents as having no or little coursework nor in-service training in long-range and facility planning. Griffin (1983) states that those administrators will soon, if entering a building program, be faced with the most complex, expensive, and enduring capital

investment decisions of their professional careers. Unfortunately, it is one for which most are ill-prepared.

Ohio's State School Building Assistance Program

Technically, the School Building Assistance Program constructs the classroom facilities for a participating district. The construction projects are "owned" by the state with the local school district acting as an agent for the state. Therefore, all contracts, plans, change orders, purchase orders, and pay requests are co-approved by the local school district and the State Superintendent of Public Instruction.

After a project has been granted permission to proceed by the State Board of Education, the participating district's residents have to approve a bond issue that will generate revenue totaling 7 percent of the district's assessed valuation. For example, suppose the State Board of Education has approved a $14 million dollar project for a district free of bond indebtedness that has a $50 million assessed valuation. The district's share of the $14 million will be $3.5 million (7 percent of the assessed valuation). If the voters of this district approved its share ($3.5 million), the state will "loan" the district the remaining funds ($10.5 million).

The loan repayment period is over 23 years. There are two parts to the repayment plan. First, the district has to collect 1/2 mill annually during the 23 year repayment period. The county auditor sends each payment directly to

the State's School Building Rotary Fund. In the example given, the $50 million assessed valuation will generate $25,000 each year. Over 23 years, payments will amount to $575,000. The 1/2 mill floats with the increase or decrease of the district's assessed valuation. This district could pay more or less than the $575,000, depending on the growth or loss of assessed valuation.

Second, O.R.C. 3318 states that the county auditor cannot collect less than 3 1/2 mills toward paying off the bonds and interest due any particular year. The difference between what is due and what is collected is also sent to the State's Building Rotary Fund. Suppose that in the year 2005, only 2 1/2 mills are needed to pay off that year's bonds and interest on the remaining bonds. In this example, the extra 1 mill ($50,000) would be sent to the Rotary Fund during that calendar year.

After 23 years, any unpaid portion of the original loan is "forgiven." Most districts will not repay an amount equal to the original loan. In addition, the district has had the use of these state funds interest free.

The reality of the State School Building Assistance Program is that most districts will not repay more than a fraction of the state's original investment. Therefore, the state should have a major role in assuring that the investment is spent wisely and cost effectively.

Summary of Other State School Building Assistance Programs

According to State Requirements Survey For School

Construction K-12 (1987) twenty-nine (29) states reported some form of state school building assistance program. Only schools in Hawaii are funded 100 percent from state funds. Arizona reported that only 3 percent of school construction came from state funds. Other states reported as follows:

| | |
|---|---|
| California | 80% |
| Maryland | Range of 78% to 96% |
| Massachusetts | Range of 50% to 75% |
| Illinois | Range of 20% to 70% |
| Connecticut | Range of 40% to 80% |
| New Hampshire | Range of 30% to 50% |
| Pennsylvania | Range of 20% to 40% |
| Washington | Range of 20% to 90% |

Ohio reported only 10 percent of the cost of constructing new schools came from the state. However, projects funded by the state could range from 10 percent to 90 percent. (The cost difference between the approved cost and 7 percent of the assessed evaluation of the district).

Twenty-seven (27) states reported some form of early state pre-planning requirements. Only fifteen (15) states have mandated community involvement requirements. All but six (6) states have some form of state planning review. In Ohio, the preliminary, schematic, design development, and contract documents must have the School Building Assistance section approval if state funds are involved.

Thirteen (13) states have set size requirements. Thirty-five (35) states, including Ohio, have recommended site size requirements. Only five (5) states reported having almost no state agency review or assigned regulatory review. These states are Arizona, Louisiana, Missouri, Nebraska and

South Dakota.

Arizona has a state level review for handicapped adequacy and fire safety and panic. Louisiana has a state level review of life and safety. Nebraska only has a required review by the State Fire Marshall (electrical) and a fire safety and panic review.

On the other hand, California requires that the construction documents be reviewed by: (1) the School Facilities Planning Division of the state department of education, (2) the office of local assistance, state allocation board, (3) office of the state architect (structural-seismic safety, fire and panic, handicapped access, and energy conservation), (4) compliance with titles 5, 21 and 24 of the California Administrative Code and several state reviews, and approvals involving an environmental review, handicapped adequacy review, energy analysis and criteria, fire safety and panic reviews, seismic safety criteria, and snow load criteria are also mandated.

The following states have state agency reviews that exceed California's requirements: Alabama, Arkansas, Delaware, Florida, Idaho, Illinois, Maine, Maryland, Minnesota, New Hampshire, North Carolina, North Dakota, Utah, Vermont, Washington and West Virginia.

Purpose of the Study

The purpose of the study is (a) to review current school construction literature and develop a school facilities construction model (b) to study the experiences of school

superintendents who have recently completed an Ohio School Building Assistance Project from 1983 through 1990 in order to determine congruence with the model and (c) make recommendations to the Ohio State Department of Education's School Building Assistance section and future superintendents involved with Ohio's School Building Assistance Program based upon my findings.

Problem Statement

The problem addressed by the study is concerned with determining if congruence occurs with the various elements of the school construction model by the school districts participating in Ohio's School Building Assistance Program from 1983 through 1990.

Research Question

The major research question of this study is: Which components of the School Construction Model were School Building Assistance Districts from 1983 through 1990 in congruence with the school facility construction model?

Importance of the Study

There are several reasons an investigation of this type is pertinent:

1. To maximize future construction dollars to offset rising construction cost and increased program demands while addressing the backlog of infrastructure needs.

2. To utilize the knowledge and experiences gained by this small pool of superintendents who have experienced the demands of a state assisted building program.

3. To provide insight for future superintendents as they enter into a facilities improvement project.

4. To gather information that may be of importance to the school building assistance section, the state legislature, and other groups that work with school facility development in Ohio.

Limitation of the Study

Congruence data relates only to districts with typically one district office administrator (superintendent) located in rural low property value districts that were eligible to participate in the state's School Building Assistance Program.

Summary

Chapter I has briefly introduced a general background on the need for studying the amount of congruence to a construction model developed from school construction literature by districts that have participated in Ohio's School Building Assistance Program from 1983 through 1990.

Chapter II reviews the literature related to planning, designing, contracting, constructing, equipping the facilities, occupying, evaluating, and establishing a preventative maintenance program for a new school facility.

The third chapter describes the research design and methodology used in this study. In addition, the population and interview format are discussed.

The fourth chapter presents a model which identifies the key components of a building program derived from the literature reviewed.

The fifth chapter presents the results of the research and an analysis of the findings. The last chapter discusses

the significance and implications of this research for future Ohio superintendents about to begin a school building program and will offer suggestions for further research. A bibliography is appended at the study's conclusion.

## CHAPTER II

## REVIEW OF THE LITERATURE

The purpose of this chapter is to examine the literature that addresses the topic of school facilities planning and construction. After the establishment of key components in the planning and construction process, subsequent chapters assess whether participating districts in Ohio's School Building Assistance Program utilized these components in planning and constructing their facilities.

The review of literature addresses the following areas: (1) a brief section on the need for new K-12 educational facilities, (2) planning, (3) designing, (4) contracting, (5) construction, (6) equipping the facility, (7) occupancy, (8) post-construction evaluation, and (9) the establishment of a continuous preventative maintenance program.

### Need For New K-12 Educational Facilities

The need for educational facilities across the United States is significant. The American School and University's Annual Report (1989) reported education construction reached an all-time high for the fifth straight year ($14.1 billion). This represented an increase of 13 percent over 1988. Of the $14.1 billion construction total, K-12 construction was over $9 billion. New construction totaled $3.7 billion, additions $3 billion, and modernization $2.7 billion.

A report entitled Wolves at the Schoolhouse Door: An Investigation of Public School Buildings (1989) noted that

over 50 percent of the nation's school buildings are over 30 years old and over 75 percent are over 20 years old. In addition, 25 percent of the nation's school buildings are in poor physical condition and not suitable for safe occupancy. The buildings often have obsolete mechanical and electrical systems, which consume large amounts of energy, while others have problems with roofing, asbestos, handicapped accessibility, fire codes, or high maintenance and operational costs.

Christopher's (1990) projected growth in the K-12 enrollment in California alone will call for an investment of more than $2 billion every year simply to keep up with the required construction of new facilities. The Ohio Public School Survey of K-12 Educational Facilities (1990) revealed that the current needs in Ohio consists of $5 billion to repair existing buildings and an additional $5 billion to replace and to provide additions. The facility problem is made more complicated by shifting populations, which create demands for new buildings. Gossett (1989) viewed building schools for these shifting populations as a major test for today's administrators. McLeod, Ferra, and Ensign (1974) pointed out that although school facilities constitute only a fraction of the total educational cost, it is a very visible fraction.

Castaldi (1977) commented about school facilities:

> The image that the community projects to the world is important to the social and economical growth of that community. The school building enhances

> the community image in two ways--through its contribution to the educational program and through its visual appeal. Silently, but forcefully, school buildings create favorable or unfavorable impressions upon those who view them. To someone exploring the community as a prospective industrial site, an attractive building on a well landscaped site may speak more eloquently than thousands of words spoken by the local chamber of commerce. (pp. 7-8)

Changes in educational programs and philosophy exemplified by bilingual programs, gifted and talented programs, enlarged vocational educational programs, and special education are now straining most school districts' facilities and will continue to do so well into the twenty-first century. Some communities expect schools to help with preschool day care, Head Start and latch key programs. Changes in instructional technology have increasingly penetrated school programs as well. Some school districts have installed computer classrooms or have experimented in satellite or distance learning, but have experienced only a small portion of the new technology.

Hill (1979) described the media center as the "bionic heart" of the electronic school, stating:

> The use of computerized data bases from across the country, individualized instructional video in study carrels, electronic card catalogs, computerized check-out, conference rooms with permanently installed television screens, and a television studio are a far cry from the media centers in most school districts today. Classrooms equipped with dedicated electronic equipment, learning areas that are linked to other districts, states, or national data bases are a possibililty. The opportunities for changes in teaching methods as a result of this technology are unlimited. However, these changes will also have an impact upon the school district's facilities. (pp. 21-22)

Vasilakis (1990) reported that many districts are facing major environmental concerns, especially in the area of asbestos, radon, and lead contamination. Specifically, federal law dictated that school districts have an asbestos removal/containment plan in place by 1989.

## Planning

### Performing Community and Current Facility/Program Analysis

According to the Guide For Planning Education Facilities (1985), developing a community analysis is the first step in planning educational facilities. A thorough community analysis includes a documentation of its history, an assessment of its present status, and a projection of its future character. In preparing the community analysis, an effort should be made to determine what citizens expect from their schools (its reputation) and what educational needs exist. A survey of a community's history provides a background against which present conditions acquire meaning. The following are examples of community characteristics that may require examination.

1. Population characteristics and density patterns.
2. Population changes due to in and out migration patterns and to fluctuations in the birth rate.
3. Changes in land usage (residential, commercial and industrial).
4. Major highway and street networks and their probable future development.
5. Changes in socio-economic patterns and needs resulting from population shifts within the community and other community changes.
6. Geographical limitations.

7. Condition and value of housing in residential areas and of commercial buildings in industrial areas. Alternate uses of areas should be considered in all planning stages.

8. Availability of community services - libraries, recreational areas, health services, public assembly spaces, etc.

9. Vocational opportunities in the community.

10. Parental expectations of the schools.

11. Citizen attitudes and aspirations in general.

12. Possible shifts in housing patterns due to attitudes about racial integration.

13. Changes in school district boundaries.

14. Identity of the clients. What are their potential needs? (pp. 3-4)

In the publication, School Planning and Design (1990), also produced by the Council of Educational Facilities Planners, the following steps for the planning process were delineated.

1. Demographics
   - A. Historical enrollment data
   - B. Enrollment projections (10 year)
   - C. Housing patterns
   - D. Zoning regulations
   - E. Infrastructure plans, roads, utilities
2. Societal and educational trends
   - A. Megatrends
   - B. Societal changes impacting education
   - C. Educators' response
3. Facility evaluation and needs

A. Educational adequacy

B. Educational environments

C. Physical condition

D. Capacity vs. enrollment

E. Accommodating technologies

F. Accommodating program change

4. Educational adequacy

A. How well the classroom relates to the instructional program

5. Educational environment

A. The total school environment for learning

6. Educational specifications

A. The educators vehicle for communication with the design team

B. Serves as the design team's basics for design

C. Staff development activities

7. Graphic analysis

A. The design team's response to the educational specifications

B. Schematic review

C. Design review

8. Final design

A. Design development

B. Construction document (pp. 13-14)

Castaldi (1977) wrote:

Educators and architects presently envision the school building as a structural envelope that houses the desired educational program. Surprisingly, this is a relatively new concept that gained national prominance immediately following World War II. Prior to this time, a school building was essentially a shelter in

which pupils and teachers assembled. (p. 7)

In addition to the information needed according to the Council of Educational Facilities Planners, Day (1986) identified two additional pieces of information necessary to collect during the planning stage.

1. Administration survey. What administrative organization, practice and procedures are currently employed? What improvements should be made?

2. Financial survey. What is the school district's financial condition? How does the district's ability to support education relate to its effort? What funds are available to support needed programs and facilities? (pp. 14-15)

Miller (1972) added community goals to this list. He suggested that local and regional planning agencies are excellent sources of information:

> Not only will time be saved by taking advantage of this planning office information, but the cooperative activities may yield related values because of overlapping functions between schools, parks, libraries and other social service agencies. (p. 20)

Miller also suggested that contact with the state department of education personnel will result in help from school plant specialists who may give informal guidance, counsel, referral and consultant services. Other agencies that may provide assistance include specially trained private architects and the university or commercial specialists who have expertise in school planning. Maps and census information may be obtained from the United States Bureau of Census Reports, the United States Geological Survey, and the county engineer's offices.

Benit (1990) added to this list the question, "would the work involved in remodeling and adding new facilities seriously disrupt existing operations?" He also noted that:

> Special emphasis should be placed upon more humanistic educational facilities replacing the old, cold, impersonal structures of the past. It will take strong efforts by the educators and school boards to develop facilities for the future, instead of reverting back to the structure of the past. Educators must insist on structures for the future from the same architects who designed the facilities of the past. This can only happen if all parties work together on the planning process and come out united on the purpose and type of facility design needed for the community and its children. (p. 30)

Determining the Planning Process

Haste is never an adequate substitute for foresight. Boles (1965) wrote:

> Is the savings of a few months of time--or a year--or two years--sufficient justification for short-circuiting the planning procedures, with a resultant loss of functional quality "built in" for the life of the building? It is far, far better to suffer the slings and arrows of outrageous inconvenience for one, two, or three years more than to build in functional handicaps that will persist and that will affect hundreds or thousands of boys and girls for half a century or more. (p. 6)

Considerable time and effort must be focused upon the master planning of a district's facility needs. School boards and administrators must place planning as a high priority. The decisions made in the initial stages will have lasting effects for 30 to 50 years or longer. The residents of the district will not only pay for the planned facility, but will spend much time within its walls.

According to Miller (1972), lack of adequate long-range planning in the past has resulted in many poorly located

school facilities because of pressured site selection. Site selection of the future must consider all environmental issues. Miller further emphasized that the construction of facilities that do not meet the educational philosophy of the community or the demands of a changing curriculum leads to continuous attention to physical needs. A well-conceived school building program will strengthen long-range financial planning and enable a community to attain the maximum educational return from its tax dollars. In addition, Miller stated,

> The curriculum of a school district is determined by needs existing in the community. Any facilities which are planned must be reflective of the curriculum and, thusly, the community. When a school district decides to construct new facilities, it is the responsibility of the school district administrators to decide upon the nature of the educational program its community wants and what it will support. (p. 18)

School Planning and Design (1990), p. 12 described planning as a team process involving the board of education, school district representatives, educational consultants, architects, engineers, special consultants, construction managers, legal counsel and bond council. Primary and secondary roles change throughout the project, allowing the professional with the greatest expertise to lead specific phases of the project.

Herman and Kaufman (1991) wrote,

> At best, strategic planning can express a clear vision of the future of your school system, as reflected in every facet of school operations. Strategic planning helps school employees, students, and the community rally around the vision and set goals to achieve it. It creates a system to monitor the

> district's progress toward that vision....to review daily and yearly plans to achieve the strategic goals and objectives. It holds people accountable and judges progress on the basis of results. It gives school employees, students and community members a greater knowledge and sense of ownership of their school system. It allows the school board and administration to identify, justify, and integrate the needs of the school organization with the needs of society. (p. 24)

Many districts have adopted the strategic planning model that Cook (1988) teaches in his workshops across the country and through his book, Strategic Planning For America's Schools. Cook's process could be used to integrate what currently exists in the curriculum with what the community perceives as necessary. These curricular additions, deletions, and modifications should be an integral part of determining future school facility needs.

According to Cook,

> Strategic planning is not just a 'model'. That word can make a very dynamic process nothing more than a dull, uninspiring scheme which can be superimposed on any existing organization or circumstance.... Strategic planning is an effective combination of both a process and discipline which, if faithfully adhered to, produces a plan characterized by originality, vision and realism. The discipline includes the vital ingredients of the plan itself; the process is the organizational dynamics through which the vital ingredients are derived. Both the discipline and the process are aimed at total concentration of the organization's resources on mutually predetermined measurable outcomes. (p. 86, 93)

The essence of a strategic plan is the identification of specific desired results to which all the effort and activity of the organization will be dedicated. And the success of any plan is determined only by the results it produces. According to Cook,

> Strategic planning is not an edict, but a concensus

> plan derived through the application of the basic principles of participative management. Specifically, (1) that those closest to the job know the job better than anyone else, (2) that strategic information flows downward and operational information flows upward, (3) the decisions should be made at the lowest appropriate level, (4) that one cannot participate above his or her level of authority, accountability and information, and (5) that accountability is commensurate with authority. (pp. 94-95)

In practice, these principles mean that the strategic plan is developed reciprocally from top down and bottom up. Without this duality, the result is a plan that is either too broad or too narrow to gain a common commitment to goals and priorities. Cook stated that "A plan that is not based on concensus is not a plan; it is an argument." (p. 95)

The components of the planning discipline and the planning process are outlined below without any explanation of how the planning exercise is accomplished.

The components of the planning discipline are:

1. Beliefs
2. Mission statements
3. Parameters
4. Internal analysis
5. External analysis
6. Competition

Note: Once these six steps are completed, the district has all the information needed to develop appropriate and realistic objectives and strategies to support the district's mission statement.

7. Critical issues
8. Objectives
9. Strategies
10. Action plans

The components of the planning process are:

1. Selection of a facilitator
2. Setting the climate
3. Selection of the planning team

4. The actual planning session
5. Communicating the plan
6. Building action teams
7. Action team work
8. Board approval
9. Implementation
10. The annual update (pp. 99-172)

The potential mass involvement of community members and school personnel in the various stages of strategic planning is designed to create a community/school based concensus on what is needed, how it is to be accomplished, what the cost will be, and how the additional revenue will be generated. The plan has broad approval and a built-in renewal process that, if properly implemented, will guide a school district through a building program and beyond.

Once the planning process is established by the board, planned visitations need to be made to those schools which are recognized to be exemplary in instruction, space allotment and design, economical operation, and community support. The visitation team will need to develop questions that can determine how input occurred that resulted in establishing the needs, wants, and desires of the "owners" of the visited schools.

After the visitations are made, a planned meeting with the community/board planning team can review and discuss aspects of the visited schools and share information gathered from talking with students, teachers, administrators, custodians, board, and community members of the exemplary schools.

Designing

Following the planning stage, the design stage begins. Several specific activities within the planning stage and design stage can and will overlap. The design phase will consist of selecting the architect and the consultant to write the educational specifications. In addition, it will include the schematic design phase, the design development phase, and construction document preparation.

Christopher (1990) presented 11 concepts, features, and details contained in exemplary school design.

1. Educators at exemplary schools have typically developed a very strong educational program with definite goals and objectives.

2. User friendly environment--create a space where students can feel at home and welcome. The use of natural material and colors and attention to the smallest details are all hallmarks of this type of design.

3. Building serves as a source for teaching about the structural, mechanical, and electrical systems used in the construction of the building. Students need to be taught how the building works.

4. Fitting into the environment.

5. Attention to detail--storage, display areas.

6. Space to provide a variety of educational settings, thus providing a variety of experiences.

7. Thoughtfulness in design--spaces not only allow activities to happen, but they also encourage them.

8. Flexibility--educators have experience at adopting their programs to the environment. Flexibility gives the professionals many more options.

9. Teachers as professionals--Example: separate work room from lounges.

10. Extended use--summer, weekends and evenings--Day care, Head Start, child care, youth

organizations, adult education, and senior citizen programs.

11. Sense of community involving staff, parents, students and citizens. (pp. 33-34)

Selecting an Architect

The employment of an architect by a board of education is one of the most important responsibilities the board exercises in the development of educational facilities. Steps to be followed in selecting an architect, according to Castaldi (1969) are:

1. Widespread publicity should be given to the board's intention to plan and construct educational facilities.

2. A list of architects should be prepared by the board. All available sources of names should be consulted, including other boards who have recently built new schools.

3. A brochure explaining the project in detail and a questionnaire requesting pertinent information should be mailed to those on the list.

4. Returns should be screened as objectively as possible and then ranked. Some form of rating sheet should be used.

5. The ten highest-ranking architects should then be mailed questionnaires requesting additional information, including names of persons for whom they have worked.

6. The ten remaining architects should be re-ranked on the basis of data contained in the second questionnaire and information gathered from direct contacts with their former clients. The number of firms under consideration should be reduced to about five at this point.

7. The architects under final consideration should be invited to appear before the board (1) to make presentations of their own choice, (2) to answer specific questions prepared in advance and placed on a rating sheet, and (3) to exchange ideas with members of the board.

8. Visits should be made by board members to some of the buildings designed by the architects and discussions should be held with other boards for whom each architect worked in the past.

9. A selection can be made after all ratings and scores applying to each architectural firm have been recorded on a rating sheet. (pp. 149-150)

According to the Guide For Planning Educational Facilities (1985), the four standard processes for selecting an architect are design competition, direct appointment, comparative selection, and competitive bidding. Design competition is time-consuming, expensive, and rarely used for selecting an architect for an educational facility. Direct appointment is the simplest of the processes. It most often occurs when prior knowledge of the architect's work is known to the board and/or superintendent through previous projects. Comparative selection is the typical method for procuring an architect. Comparative selection involves choosing from a group of candidates who have submitted to the owner information and materials concerning their qualifications.

The Guide to Planning Educational Facilities (1985) stated that,

> When an architect is invited to express interest and submit qualifications, he should be given all pertinent information about the owner and the project. The minimum information to be supplied to prospective architects includes:
>
> 1. Name and address and responsible administrative officer representing the owner.
>
> 2. Description of the project being considered, specify the number of students, location, area required and other related information.
>
> 3. Time schedule proposed for the project.

4. Brief statement about the projected involvement of staff members, governmental officials, community members and students in the planning process.

5. Description of the educational system and its educational philosophy.

6. Description of financial resources available for the project, fee structure, and extent of services required. (p. D12)

Providing the architect with this information serves several functions. It indicates the owner's attitude toward the planning process, it permits the architects to evaluate the nature of the project, and it provides the basic information on which the architects may build responses and pertinent data during the interview.

Architects invited to submit their qualifications for consideration should be asked to provide the following information:

1. Name and address

2. Brief history of the firm, including date established, record of growth in the completion of high quality buildings, type of work, and any specialties.

3. Names of principals and key staff who will work on the project, their professional background, registration, and affiliations.

4. List of projects completed in recent years showing type, size, cost, location, and dates.

5. List of references, including clients, contractors, and financial institutions.

6. Statement of philosophy, approach to the design, cost control, and construction process.

7. Statement of policy in handling of projects, participation of principals, assignments of personnel and engineering services, and other specialized services.

8. Copy of the firm's brochure, as well as information about and photographs of completed buildings and contact person for possible visitation of completed projects by the owner. (pp. D13-14)

Competitive bidding is often used to obtain work and products in other phases of the construction business. It is not an appropriate way to obtain professional services for the construction of schools.

The publication "You and Your Architect" (1987) published by the American Institute of Architects, pointed out that different projects require different combinations of architectural services. Most projects require a set of basic services: preliminary (schematic) design, design development, preparation of construction documents (drawings, specifications, construction contract agreements) and administration of arguments between the owner and the contractors. Additional services that the owner may wish to consider are:

1. Facilities programming--Educational specifications (require the architect to be involved with the development of the educational specifications)
2. Budgeting
3. Site utilization and utilities study
4. Environmental analysis
5. Planning and zoning specifications
6. Preparation of material for public referendum
7. Special cost or energy analysis
8. Models and/or presentations
9. Long-range plan for site landscaping and development. (p. 20)

In addition to the services provided, the architect's contract needs to include adequate construction contract administration services (observing the construction work for conformance to drawings and specifications, processing the contractor's shop drawing, material and produce samples, reviewing the results of construction tests and inspections, evaluating contractor's request for payment, handling request for design changes during construction, and administrating the start-up and close-out process for the owner).

The contract needs to spell out how disputes between the owner and architect will be settled (arbitration/mediation). Also, include a post-construction evaluation of the building six months to a year after completion of the project is desirable.

Boles (1965) stated that the architect's role should include:

1. Ability to function as part of a complex design team.

2. Advisory membership on all planning committees, as well as the preparation of schematic design and final drawings.

3. Their responsibilities also include provisions of bid specifications, proposal review, contract award recommendations, supervision and administration of all contracts, approval of all requests for contractor payouts and the provision of a limited warranty after occupancy. (pp. 130-136)

No design should begin without first being analyzed for its fit into a district's master plan. Cleland (1984) suggested that "The architect needs to have the ability to

listen and participate with the district's planning and/or building team." (p. 6) Without this, Cleland was convinced the design and matching of buildings to programs could not be accomplished. The architect must study and adhere to the educational specifications.

Ashley (1969) provided guidelines to be followed during the interview process. Included is the following statement: "Don't ask the prospective architect to make sketches, predictions, or estimates. It's premature at this point." (p. 75)

Benit (1990) and Day (1986) recommended employment of the architect in the early planning stages of the construction project. This provides the architect an opportunity to gain insight into the community's needs and desires.

Selecting the Educational Specification Writer

The educational specification writer's role in the overall picture is more advisory than either the architect or the superintendent. Castaldi (1987) described the educational consultant as having the prime responsibility for the educational planning of a proposed school building. This consultant is in an excellent position to assist the architect in converting educational concepts into school facilities.

The consultant can be of assistance to school officials in a number of ways:

1. Advise school officials in the selection of an architect.

2. Be of assistance in the selection of a school site.

3. Review any existing long-range educational plan and make recommendations in light of new developments.

4. Prepare educational specifications that reflect the thinking of the institutional planning team and the concepts expressed by school officials and boards of education.

5. Review architectural plans and judge them in terms of their ability to satisfy educational needs.

6. Evaluate all ideas submitted by the institutional planning team and make recommendations regarding the disposition of each suggestion. (p. 150)

Often, according to The Guide For Planning Educational Facilities (1985), the educational planner serves the planning team as a catalyst and, at times, a referee. Unlike many of the other planning professionals, the educational planner's path to the profession is less clearly defined by an academic background. Their backgrounds are diverse and include such fields as architecture, educational administration, engineering, or business administration. Colleges often employ planners, but also ask them to teach or perform other administrative services.

According to Boles (1965), (p. 79) the planner needs to be articulate in verbal and written skills in order to communicate clearly to boards and committees the status of all phases in the planning and decision process. The two primary areas of the planner's responsibility are: (1) determining the general requirements for school facilities and (2) developing educational specifications. If a consultant is not employed, the administration alone must

assume this responsibility.

Developing Educational Specifications

According to Castaldi (1969), educational specifications "serve as the link between the educational program and school facilities." (p. 149) The purpose of educational specifications is to describe clearly and concisely the various learning activities, their spatial requirements and special features of the learning activity to be housed in the school.

In the Guide For Planning Educational Facilities (1985), the educational specifications document is described as a vehicle of communication between the educator and the architect. The educator identifies the educational needs; the architect bases his facility design on this information.

Herman and Hirsekarn (1975) stated that building principals, classroom/subject matter teachers, curriculum specialists, media specialists, physical education teachers, special education teachers, vocational education teachers, music education teachers, business education teachers, etc., need to be involved in developing the educational specifications. The architect acts as a consultant to the professionals, board members, and educational consultants. The following is a summary of elements to be covered in the educational specifications.

1. How many pupils are to be served in the area?
2. How many staff members are to utilize the area?
3. What types of educational activities are to take

place in the space?

4. What type and quantities of equipment and supplies are to be utilized in the instructional space?

5. Where should the space be located in relationship to the other instructional purposes?

6. What are the electrical, plumbing, heating, ventilization, accoustical, and other specialized needs of the instructional spaces?

7. Will the space be used for multiple instructional purposes?

8. Will the space be used for after school, co-curricular or summer activities?

9. Will the space be utilized for community activities?

10. What other specialized considerations need to be met to house the planned activities? (pp. 150-151)

After answering these 10 questions, the educational planners must look at the future planning needs in the areas of flexibility and functionality, aesthetics, economy, comfort, health, and safety needs.

Another format proposed by the Guide For Planning Educational Facilities (1985) includes seven sections on educational specifications. These sections are as follows:

1. Project rationale--why the facility is being built, its intended use, and the general purpose it is to serve.

2. The community--a brief description of the history and citizens, maps, attendance area, and proposed site(s).

3. The educational plans--curriculum plan, instructional methods, support plans, etc.

4. Description of activity areas--instructional areas (regular classrooms, science labs, industrial arts spaces, physical education areas, etc.) administrative areas (offices for administrators, guidance and health personnel,

storage, secretarial), and service areas (media center, cafeteria, food service areas, custodial areas, etc).

For each of these functions, the following information is required: goals, planned usage, number of users, staff required, simultaneous grouping, relationship to other activities, spatial requirements, support facilities, environmental variables, utilities, storage, display, furniture, and equipment.

5. General building considerations--health and safety, economy, flexibility, circulation, communication systems, accessibility, and building security.

6. Summary of spatial relationships.

7. Summary of spatial requirements. (pp. E4-8)

Nelms (1965) reported on a study to develop a standard form to be used as an instrument for preparing educational specifications for elementary and secondary school buildings:

Standard Form of Educational Specifications For Elementary and Secondary School Buildings:

I. General data section

A. Identification data

1. Time placement of plant planning and construction

2. Locate placement of the school plant construction

3. Personnel identification

4. Type of construction

B. Educational philosophy of the school and community

1. Educational goals

2. Anticipated methods and techniques of teaching

3. Ways school plant may aid in teaching educational goals

C. School organization

1. Type of school

2. General school and class size data

3. Curriculum content

4. Activity curriculum content

5. Special services to be offered by the school

II. Site selection and development

A. Site selection

1. Site selection committee

2. Checklist for site selection

3. Geographical data of selected site

4. Site size and shape

B. Site development

1. Site development checklist

III. School environmental factors (planning of boiler rooms, electrical services, sanitary services, etc., needs to be planned by the engineer).

A. General characteristics of environmental factors

B. Spatial factor

C. Thermal factor

D. Lighting factor

E. Sonic factor

F. Aesthetic factor

G. Safety factor

H. Balance of environmental factors

IV. Administrative suite

A. General characteristics of the suite

1. Purpose

2. Location

3. General spaces to be provided

B. School executive quarters

1. Superintendent's office space

2. Principal's office space

3. Assistant principal, dean's, or supervisor's offices

4. General office space

5. Guidance suite

6. Health suite

7. Administrative conference room(s)

8. Teachers' lounge

V. Auditorium

A. General characteristics

B. Location

C. Seating space

D. Stage requirements

E. Dressing rooms

F. Auxiliary rooms

VI. Food service section

A. General characteristics

1. Purpose of the food service center

2. Location of the food service center

3. General spaces to be provided

B. Food preparation center

1. Food circulation floor chart

2. Receiving dock

3. Kitchen area

4. Storage rooms

5. Manager's office space

6. Housekeeping equipment and supplies storage

C. Dining area(s)

1. Organization of the dining area(s)

2. Equipment for the dining area(s)

D. Environmental aspects of the food preparation center

1. Structural design

2. Plumbing requirements

3. Lighting and electrical requirements

4. Aesthetic requirements

VII. Physical education

A. General characteristics

1. Purpose and location

2. General specs to be provided

B. Gymnasium floor space

1. Construction data for gymnasium floors

2. Playing - floor marking

3. Gymnasium seating

C. Smaller activity rooms

1. General characteristics and location of auxillary rooms

D. Physical education classrooms

E. Swimming pool requirements

F. Dressing rooms

G. Shower room requirements

H. Toilet room requirements

I. Team room requirements

J. Equipment drying rooms

K. Laundry room requirements

L. Equipment storage requirements

M. Physical education offices

N. Outdoor physical education facilities

VIII. Group rest room facilities

A. General characteristics

B. Group rest room equipment

IX. Library

A. General characteristics

1. Purpose and location

2. General use of spaces to be provided

B. Specifications for specific library areas

1. Student reading rooms

2. Storage space for books and periodicals

3. Librarian's office and workroom

4. Studio and control room for ETV

5. Individual study carrels

6. Library conference room

X. School circulation

A. Corridors

B. Stairways

C. Exits

D. Bus loading platforms and traffic lanes

E. Other vehicle traffic lanes

XI. Teachers' offices

A. General characteristics

B. Organization of the teachers' offices

C. Size of teachers' offices

D. Equipment and furniture of the teachers' offices

XII. Custodial services

A. General spaces required for custodial services

B. Location of the central custodial services in the plant

C. Description of custodial storage room(s)

D. Description of custodial internal storage space

E. Description of custodial external storage space

F. Head custodian's office

G. Custodial equipment to be stored

XIII. Science suite

A. General characteristics

B. Requirements of the general science room(s)

C. Requirements of the biology room(s)

D. Requirements of the chemistry room(s)

E. Requirements of the physics room(s)

F. Darkroom requirements

G. Requirements for special science areas

H. Science storage facilities

XIV. General classroom section

A. General characteristics of the general

classrooms

1. Purposes and location of the general classrooms

2. General classroom size requirements

B. Activities of the general classrooms

1. Teaching techniques to be used

2. Non-teaching activities

C. Equipment and furniture for the general classrooms

XV. Special classroom section

A. General characteristics of the special classrooms. Subjects which require special classrooms and their general location within the building.

B. Home economics suite

C. Business education suite

D. Music facilities

E. Art room(s)

F. Industrial arts suite

G. Language laboratory

XVI. Kindergarten section

A. Kindergarten room size requirements

B. Location of the kindergarten room(s)

C. Kindergarten program

D. Auxiliary space for kindergarten classrooms

XVII. Primary classroom section

A. Primary organization

1. Definition of primary classrooms

2. Primary classroom size requirements

3. Location of primary classrooms

B. Primary program of activities

C. Auxiliary space for primary classroom

XVIII. Intermediate classroom section

A. Intermediate classroom organization

B. Intermediate program of activities

XIX. Multi-purpose room section

A. General characteristics of multi-purpose rooms

B. Activities of multi-purpose rooms

C. Size requirements of multi-purpose rooms

XX. Classroom for exceptional children

A. General characteristics of the classrooms for exceptional children

B. Facilities for trainable children

C. Classrooms for educable children

D. Facilities for children with motor handicaps

E. Facilities for children with speech and hearing handicaps

F. Facilities for children with visual handicaps (pp. 44-46)

Selecting and Acquiring a Site

The American Association of School Administrators (1960) in Planning America's School Buildings stated,

> School administrators generally approach site acquisition in one of two ways. The first, and most prevalent, is a short-range plan of action to meet a deadline. This occurs when a school system decides to construct new facilities, and no site has been acquired. The other method of site selection is a long-range program of site planning, when various sites are acquired by the school district, and the most suitable one is used for the planned facility. (p. 134)

According to the Guide For Planning Educational

Facilities (1985) several questions should be answered regarding potential sites. The questions include:

1. Will the site support the education program?
2. Is the site's location convenient for the majority of students?
3. Is the site the right size and shape?
4. Is the topography conducive to desired site development?
5. Is the general environment aesthetically pleasing?
6. Is the site safe?
7. Is the air quality healthful?
8. Is the site free of industrial and traffic noise (both ground and air)?
9. Does the land drain properly and are other soil conditions good?
10. Does the site have desired trees and other natural vegetation?
11. Is water available?
12. Are there easements of any nature affecting the use of the site?
13. Is the site suitably orientated for energy conservation?
14. Is the site located on a flood plain?
15. Is the site near other community services - libraries, parks, museums?
16. What is the relationship of the site to existing educational facilities?
17. How is the surrounding land zoned - will its development enhance the site?
18. Are utility services available?
19. Is the site served by public agencies - police, fire departments, etc?

20. Is the site easily accessible for service vehicles?

21. Can the land be shared with other community facilities and organizations, especially parks?

22. Will the site provide desirable open spaces for the community where it is needed?

23. Is the site available?

24. Is the site expandable in the future?

25. Is the site affordable? Are life-cycle costs reasonable? (pp. F7-8)

Taylor (1958) stated that other components of the school program also must be considered when selecting a school site. These are:

> Space and equipment for physical education, athletics, outdoor study, play and recreation for children, outdoor assemblies, drivers education, camping instruction and meeting places for boys' and girls' clubs, parking for both school people and visitors, facilities for summer recreation for children and adults, approaches to buildings, areas for exhibits, picnics, landscaping and school and community beautification. (p. 44)

Boles (1965) believes a more astute site selection can normally be made after the educational specifications are established. He listed the following guidelines for site acquisition:

1. It is better to take the school to the children than to take the children to the school.

2. The school site should reflect the place of the school in community life.

3. The school site is important to the school and the environment important to learning.

4. All procedures leading to the acquisition of school sites should be business-like.

5. A consideration in site selection should be the part that the site can play in providing

for a certain part of the total curriculum.

6. Any school site should be healthful and safe.

7. Any school site should be attractive.

8. Any school site should be economical. (pp. 115-117)

Day (1982) identified the following guidelines for site development and site selection:

1. Land use--educational/beauty

2. The school--park plan

3. Open space reserves--ecological purposes--preservation of marshes, streams, open ditches, flood plains, aquifier recharge areas, steep slopes, forest and woodlands, and farm land

4. Open space zone

5. Community traffic patterns

   A. Linked to primary arteries

   B. Linked to pedestrian paths, provisions to cross major arteries

   C. Community to have direct access to school buildings and outdoor facilities/parking lots.

   D. Primary indoor and outdoor activities should avoid direct orientation to traffic arteries.

   E. Physical/visual buffers should be developed

6. Historial aspects (pp. 21-23)

The Guide For Planning Educational Facilities (1985) published some general rules for school administrators to follow when determining the size of the site.

1. For elementary schools:

   It is suggested that a minimum site of 10 acres be provided, plus an additional acre for each 100 pupils in the projected maximum enrollment.

2. For middle school and junior high schools:

   It is suggested that a minimum of 20 acres be provided, plus an additional acre for each 100 pupils is the projected maximum enrollment.

3. For senior high schools:

   It is suggested that a minimum of 30 acres be provided, plus an additional acre for each 100 pupils in the projected maximum enrollment (p. F-10)

After a site has been selected, the school board must acquire the site, if it is not already owned by the school district. According to the Guide For Planning Educational Facilities (1985), there are five legally accepted methods.

1. Purchase from the owner--this is usually the most satisfactory method.

2. Accepting property as a donation--acquisition of property by this method is desirable only if there are no reversion clauses, and the site has a clear, unconditional title.

3. Condemnation of private property (with purchase at fair market value)

4. Receipt of surplus government property, or

5. Lease of government owned property. (pp. F11-12)

After the site has been selected, the Guide For Planning Educational Facilities (1985) indicates that a comprehensive survey needs to be conducted. The survey should provide at least the following information:

1. Title of survey, property location, certification and date

2. Scale and compass orientation

3. Tract boundary lines, courses, and distance

4. Names of abutting property owners

5. Bench mark with assumed elevations

6. Names and locations of all existing road right-of-ways

7. Locations of all existing structures on the site, including buildings, foundations, bridges, wells, cisterns, walls and fences, and rock outcropping

8. Locations, type, size, and flow of all existing storm and sanitary sewers on or contiguous to the tract, including top and invert elevations of all manhole and inlet and invert elevations of other drainage structures

9. Location of roads, drives, curbs, gutters, steps, walks, paved areas and the like, indicating types of material or surfacing

10. Location, type and size of all water and gas mains, meter boxes, hydrants, and other appurtenances

11. Location of all utility poles, telephone lines and power lines, with identification of nearest leads either on-site or off-site; pertinent information and ownership of all utilities

12. Locations of all swamps, springs, streams, drainage ditches, lakes, and other bodies of water; line of maximum flood plane if applicable

13. Outline of wooded areas, location of trees and plants, identification by type, identification of trees with trunks over eight inches in diameter at waist height, and identification of productive and non-productive plants

14. Road elevation for all improved roads on or adjacent to property; improved gutter elevations on property line side at intervals of 50 feet

15. Elevations throughout the site sufficient to develop a complete and thorough contour map. (pp. F12-13)

Day (1982) recommended in addition to previously mentioned concepts, "that the board/committee(s) develop a program for the site development that states what shall be removed from the site, what shall remain on the site, and

what shall be created on the site." (p. 21)

Construction Options

The design selected and the funds available will influence the architect as to the type of basic construction necessary to accomplish the goals set forth in the education specifications.

Prior to World War II, the one-at-a-time approach to school design and construction existed. The accelerated need for new construction forced architects and school officials to look for alternatives after World War II. Griffin (1971) reported that several states have, at various times, attempted to solve some of these problems through the development of stock or model plans. School districts could select the plan best suited to their particular needs. The State of New York took this approach in the late 1950's (pp. 5-6).

Boice (1971) reports that Architectural Forum and the Educational Facilities Laboratory (EFL) sponsored a national conference in 1961 hoping that an alternative to the standard school plan could be developed. The charge of the conference was to investigate the feasibility of developing a system of standard building components which would:

1. Offer architects desired design flexibility in meeting the changing program needs of individual schools

2. Reduce the cost of school construction and give better value for the school building dollar in terms of function, environment, first cost and maintenance

3. Reduce the time needed to build a school. (p. 83)

This conference led to a study by Stanford University's School Planning Laboratory which resulted in the formation of the School Construction System Development Program (SCSD) in early 1962. According to Griffin (1971), the SCSD program accomplished several construction breakthroughs, the most important of which were:

1. A standardization of ceiling/lighting design suspended from the ceiling joist
2. Superstructure components that permit wall flexibility to meet changing/varied educational functions
3. Provided the framework that has empowered schools to accept bids on the various building systems such as electrical and mechanical contracts separate from the general contractor
4. Forced cooperation among the different manufacturers of components sandwiched in the ceiling space to produce compatible systems. (pp. 16-18)

As a beneficial by-product, the systems approach gave educational planners and architects the ability to design flexible and varied types of spaces within new school products. As this bonus became evident, it effectively opened the eyes of teachers to educational change across the country (Griffin, 1971, p. 19).

The Metropolitan Toronto's Study of Educational Facilities (SEF) program extended systems building into a new dimension. To the basic SCSD subsystem, SEF added exterior walls, plumbing and roofing. The SEF electric-electronic subsystem constituted a radical improvement to the conventional electrical distribution. It helped with the

adaptation of audio-visual and computer instruction uses. SEF allowed schools to experiment in individualization, non-graded education and encouraged the whole gambit of modern audio-visual techniques (Griffin, 1971, pp. 20-35)

The Montreal Catholic School Commission (MCSC) followed Toronto with a system building program that employed one major difference. MCSC decided to use a closed system as opposed to Toronto's SEF open system. What made Montreal's program an essentially closed system was simply one difference in bidding requirements. In Toronto's program, each manufacturer had to certify his subsystem compatible with two manufacturers' subsystem at each mandatory interface, whereas Montreal's required compatibility was with only one manufacturer at each interface.

Though the number of manufacturers bidding on each program was compatible, the difference in total building systems is startling. In Toronto, 13,000 different building systems were deemed to be compatible. Montreal identified only 11 such systems and only three satisfied the budget limitations. In Toronto, 4,000 identified building systems qualified. (Griffin, 1971, pp. 50-55)

Architect Begman, director of Montreal's program stated:

> In addition to better integration, we think we got better prices, because a manufacturer was required to detail a practical technique for integrating his subsystem at each interface, he knew precisely what material and labor it took to integrate his subsystem with others--so many steel angles, field welds, etc. With this information, a manufacturer/contractor could bid an exact price. (Griffin, 1971, p. 51)

Cleland (1975) described the Detroit Construction System Program (CSP) project, which began the planning phase in 1968 and the buildings were occupied in the fall of 1972. CSP added several components to the SEF model, some of which are:

1. Used a construction management contract (involved with construction supervision, scheduling, coordination of inspections, tests, permits).
2. Improved the performance specs of many subsystems components.
3. Required mandatory descriptions of method the contractors planned to use to interface with other subsystems.
4. Required the identification and preseal of engineers used to design pre-fabricated subsystems.
5. Developed flexible payment incentives for work done on time.
6. Established a time period after the planning phase to attract/encourage companies to submit bids (pp. 3-8)

Featherstone (1972) made an analysis of the construction cost of the CSP project, which revealed that the systems came in under budget, the nonsystems came in over budget, with overall costs coming in 14 percent under budget. The construction phase was shortened 10.2 months on the average. Other projects have followed the lead of SCSD, Toronto, Montreal and Detroit, including Boston and the Florida Schoolhouse Systems Project (SSP).

Brubaker (1989) wrote about a "Prototypical Design" concept that is expected to reduce the amount of time required to plan and build schools. The idea is to do the necessary research to create appropriate building components

which can then be assembled or combined on different sites. For example, a particularly good kitchen is designed. When a new school is planned, the prototype kitchen is incorporated into the overall design. The planning process is quickened. Budgeting is easier. Bidders are familiar with the kitchen plans and specifications, so bidding is more accurate and faster. The building process is accelerated by using the prototypes, research and experience of other projects.

Brubaker believed that if planning and design attention is given to the teaching and learning spaces, a prototype classroom may be developed. Space, working walls, floors, ceiling, windows, doors, lighting, air conditioning, computers, telecommunications, and other audio-visual considerations are planned in detail. Then, prototype classrooms can be clustered together to create larger prototypical spaces. These spaces, along with other components, are then combined in single or multi-floor configurations to create complete schools.

School designing teams in the 1990's have increased flexibility and options that, if pursued, will enhance the match between the facilities and the educational specifications.

Schematic Design Phase

During the early stages of the schematic design phase, the architect explores alternative concepts for the building, using the knowledge and understanding gained from meeting with the board and administration, participating with staff

during the development of the educational specifications, and from the survey information provided for the site.

Brubaker (1989) noted in the Wilkes Encyclopedia of Architecture that different concepts are usually considered that involve a variety of space relationships, degrees of compactness, number of stories, various circulation systems, and an array of building forms. Bubble diagrams may be helpful in organizing and conveying alternatives. A process involving the board of education, the administrative planning team and input from the various faculty and community committees gradually allows the evolution of the final schematic design.

DeJong (1990) stated that a district should never allow the architect to produce a schematic design in isolation. These design concepts need to go back to the planning committees, administration and board for their input. Involving the maximum number of people in the decision making process will allow the district to get more for its money and will result in a better product.

Decisions are made on which designs hold the most promise. These selected concepts are then further developed, eventually resulting in one basic design that fits into the site and will accomplish the needs expressed through the educational specifications. The architect then is ready to prepare "preliminary estimates" of construction and site development costs.

When the schematic drawings are ready for approval, they

will include a site plan, simple exterior and interior evaluations, or perhaps a perspective rendering. These drawings will not include any engineering drawings, but preliminary specifications in outline form should accompany and supplement the preliminary drawings in sufficient detail to make clear to the board the type of construction, the interior and exterior finishes, the type of mechanical, electrical, and plumbing provisions which will be implemented. The amount of funds available may necessitate some considerable redesign of the approved design concept.

Design Development Phase

The two or three months immediately following the board's approval of schematic design may well be the most important months during the entire project. The administrative team, staff and community committee(s), and the educational specification writer needs to review every segment of the architect's progress as the final design detail is being developed. These groups need to visualize the finished design in terms of compatability with the education program, student traffic patterns, and ease of maintenance. Once the design development phase is completed, board approved and bids accepted, any modification will require a change order. Change orders are costly and their administration is very time consuming.

Changing construction technique and availability of new materials, allows the architect the freedom to be imaginative and creative. Aesthetics, color, and lighting

(illumination level, brightness ratios, brightness balance, reflectance, contrast rendition and reflections) are developed during the design development phase.

Recent research on the effect of noise on the learning process has shed new light on the reaction of students to the presence of disturbing noise levels. According to Glass (1985), "In order to tune out the noise, the student also tunes out the instruction (p. 10)."

According to the Guide For Planning Educational Facilities (1985, p. I10) designing a good accoustical environment requires the solution of two problems: (1) controlling sound within a particular space so that sound that is to be heard can be heard well, and (2) preventing the intrusion of unwanted sounds from outside the space.

Accoustics are affected by the use of the space, its size and shape, its relationship to other spaces and activities, its location within the school building, and its proximity to sound-producing objects on or adjacent to the school site.

The Guide For Planning Educational Facilities (1985) also lists several other areas that need to be thoroughly reviewed. Questions about security objectives need to be answered: Are all areas used by students easily supervised by sight or sound? Can the building be zoned by the use of locks and/or gates? Are all areas accessible for handicapped students? The thermal environment also will be developed during this phase. There is more to the thermal environment

of a school building than the HVAC system operating within it. Air temperature and quality are determined by a number of interrelated factors, including:

1. The number, size, insulative qualities and orientation of windows
2. The quality and extent of insulation
3. The quality of sealing
4. The color of the building shell
5. The use of interior and exterior shading devices
6. The climate
7. Building orientation
8. Landscaping - trees, site grading, etc.
9. The number of building occupants and their activities
10. The lighting system
11. The efficiency of mechanical and electrical systems
12. Other equipment operating and generating heat (p. I16)

The architect/engineer must consider all the above factors when designing a school building to provide thermal comfort with respect to their cost (both initial and life), their effect on energy use, and their impact on the perceptions and behaviors of the building users. This delicate task often involves balancing one need or priority against another and selecting the most advantageous alternative.

Minimizing energy use over the life of the facility involves the following:

1. Minimize uncontrolled or unwanted heat transfer through the building shell. This means efforts should be made through effective insulation, through sealing, careful window placement, building orientation, and protected foyers at entrances.

2. Specifying a heating, ventilating and cooling system that uses energy conservatively and can be operated efficiently by the district's maintenance personnel. New facilities can be computer monitored and controlled.

3. Reviewing warranties and life cycle cost of the equipment being specified. (Guide For Planning Educational Facilities, 1985, p. II-8).

HVAC, plumbing, electrical, fire security, building security, telephone cable, computer cables and networking cables, education television cable., etc. can all be designed and organized to fit into the sandwich space (between ceiling tile and steel decking) in corridors. This eliminates interference with the educational process within classrooms if a minor mechanical problem occurs.

According to Brubaker (1990), the impact of technology on the design of new facilities needs to be considered. The electronic revolution has exploded beyond the dreams of even the most breathless early enthusiasts. The learning environment will never be the same. Electronic, digital, and miniaturized devices for organizing information are proliferating. A recent study sponsored by Apple Computer, Inc., predicted that by the year 2000, students will be using electronic notebooks with flat screens, memory chips, data entry keyboards, etc., that will serve as electronic links to both home and school. Although the architect, planner,

school and community individuals cannot predict the future, conduits need to be planned in the original design technology that will permit easy access when schools are ready to adapt to future technologies.

Strevell (1972) pointed out that involving the classified employees in reviewing the areas where they work is a must. The custodians need to review restrooms, locker rooms, etc., to eliminate dust collecting or hard to clean surfaces and areas. Secretaries need to analyze their work space for items like telephone and computer jacks, storage and filing. Even the cafeteria workers need to analyze the final proposal of their work space.

Construction Documents

The final component of the design development phase consists of complete and detailed drawings, specifications, and cost estimates. Boles (1965) reported that a 100,000 square feet building will require 50 plus separate sheets detailing the site, structural, exterior, interior, plumbing, electrical (including fire alarm and security details) HVAC, and landscaping. The building specifications spell out what is to be included by the contractors' bidding and constructing the project. It often lists a specific product or gives the contractor the option of a product equivalent or better than the one specified. If possible, the district should find individuals in the district who are familiar with each phase of the building trade, who can review the blueprints and specifications in their area of

expertise with the administration/board of education. When the administration and board of education are convinced that the final documents represent the school facility to be developed, and not until then, the documents should be approved by resolution.

Once the final prints and documents are approved by the board, the documents may have to be approved by several other governmental agencies. Several states have a state architectural office that reviews the plans for fire and safety regulations, handicapped accessibility, earthquake protection, etc. After all required agencies have "signed-off" on the documents, the contracting process is ready to begin.

## Contracting

Boles (1965) noted that usually the official approval of final working documents (design development) is a signal for the contracting process to commence. Cost becomes definite and final only when the contractors state the sums for which they will do the work drawn and specified by the architect, and the board of education accepts the offers of some of them. To prevent the suspicion of favoritism or nepotism, states have laws that provide for competitive bids.

## Advertising and Bidding the Project

Carefully prepared bidding documents and detailed procedures are necessary to obtain all the potential benefits of the competitive bidding system.

In Ohio, the Ohio Revised Code Section 3318.10 requires

a construction project anticipated to exceed $15,000 to be advertised by inserting an announcement in a local daily or weekly newspaper for four (4) consecutive weeks. The advertisement for bids shall state the time and place of receiving and opening the bids, where the bidding documents may be picked up and the deposit required. A brief description of the project, and any conditions which are attached to preparing, submitting and opening the bids are also included. Ohio law requires a complete set of the blueprints and specifications to be kept on file in the office of the treasurer of the district.

In addition, according to Boles (1965), the architect should prepare a list of firms to be invited to bid. The F. W. Dodge Corporation maintains "plan rooms" in most major cities of the United States for the express purpose of allowing architects to display documents where they can be examined by contractors. Those potential bidders who are definitely interested in submitting bids on a project as a result of notification, reading an advertisement, or inspecting the working documents usually will request individual sets of the documents for their own use and the use of subcontractors or material suppliers while collecting subcontract prices and preparing bids. Usually, a deposit is charged to anyone requesting a set or sets of documents. A deposit helps limit the number of sets of documents the architect must reproduce, it prevents most persons from requesting documents out of sheer curiosity, and it helps to

guarantee the return of the documents. The deposit is usually refundable to contractors making a bonafide bid.

Regardless of whether or not it is required by law, ample time should be allowed for contractors to prepare their bids. Most states require a minimum of four (4) weeks. In large projects, it may be advantageous to allow the contractor up to six weeks. There are literally hundreds of kinds of items on which quantities must be computed and prices secured. Contractors also must get an estimated cost of labor for each of the trades involved. (Boles, 1965, p. 158)

Receiving Bids

The treasurer or designee should place the date and time the bid arrived on the outside of the bid package. The package then needs to be put aside until it is time to open all bids.

Tabulating Bids

Boles (1965) stated that as bids are opened, all pertinent information contained in each should be read aloud clearly, and all bid forms should be made available to any interested parties who care to examine them. At least two "official" tabulations should be made on the spot, and these should later be checked against each other and against the original bid proposals. No bids should be accepted after the posted deadline and all late bid packets should be returned unopened to the sender.

Analyzing Bids

States with laws relating to bids on public buildings usually word the laws to say that the authorities must accept the "lowest and best" bid. This kind of wording allows the exercise of some discretion on the part of a board of education.

Boles (1965) stated:

> Anyone can tell at a glance which of several base bids is for the fewest dollars, but to determine the lowest and best bid on a particular bid requires that at least the following questions be answered:
>
> 1. Have all the requirements for bidding been met?
> 2. Was the bid received on time?
> 3. Is the required bid bond included in the correct amount?
> 4. Is the proposal in proper form?
> 5. Are requested bids on alternates included?
> 6. Is the bidder able to perform the work on which he is bidding?
> 7. Is the bidder financially responsible with a sound credit rating?
> 8. Does he have access to the necessary equipment?
> 9. What do his earlier clients say about his ability to read and follow construction documents?
> 10. Is there any special consideration that indicates some bid other than "lowest" might be best? If the budget will allow acceptance of some or all alternate bids, the apparent low bidder may change several times as prices of the base bid plus certain alternates are computed.
> 11. Do all the materials to be supplied under the "or equal" clause of the specifications measure up? (pp. 159-161)

Awarding and Execution of Construction Contracts

According to the Guide For Planning Educational

Facilities (1985), after bids have been received and examined, contract awards are approved by a resolution passed by the board of education. The form of the contract document is generally prescribed by the local or state board of education or by state statute. It is advisable that the board's attorney review the contracts prior to the board's approval. The general rule of law is that the contract subject of the bid cannot be changed in substance without rebidding. Negotiations are permissible to clarify or correct the agreement. Change orders for any contract may be entered into if it does not constitute new work that legally needs to be rebid. The contract needs to provide for a written process for change orders initiated by the architect. Each change order needs to be approved by resolution by the board.

The Guide For Planning Educational Facilities (1985) also stated that it is common practice for contractors, either with the bid or following bid opening, to submit to the architect a list of subcontractors they propose to employ on the project. The list of approved subcontractors should be a binding part of the contractual relationship and helps to establish the level of quality which can be expected on the project. It is the contractor's responsibility to develop a schedule of progress for the project. The schedule establishes when and how long the various divisions of work will occur. The architect is responsible for insuring that the general contractor holds regular meetings of the prime

contractors and their subcontractors. These meetings, referred to as job meetings, are the key to successfully staying on the originally proposed schedule.

## Construction

### Ground Breaking

Shortly after the board of education has awarded the prime contracts, but prior to the actual construction beginning, the district will want to hold a ground breaking ceremony.

Normally, key individuals will give short speeches thanking the individuals and groups that have worked hard through the compaign, planning, and design processes. The following are just a few of the individuals who can be invited: board of education members (present and past), administrators of this and neighboring districts, county and/or state school administrator representatives, county and state board members, local and county elected officials, certificated and classified staff, and members of all community ad hoc committees. A special effort needs to be made to encourage students, parents, and district citizens to attend. In addition to these elected and community individuals, the architect and prime contractors need to participate.

A ground breaking exercise can be used for several purposes, such as public relations, thanking individuals, developing community anticipation and excitement about the new project, and serves as a tangible signal that the

construction phase is about to begin.

Normally, after the speeches and introductions, individuals will be invited to use a spade to turn a symbolic shovelful of dirt. Drawings, models, and renditions can be displayed. A ground breaking ceremony is an excellent vehicle to earn community acceptance of the total building project.

Construction Administration

Traditionally, the architect or an employee of the architect observes the project on-site to protect the owner against defects and deficiencies in the contractor's work. In theory, the architect turns the contract documents over to the contractor, who in turn, performs in accordance with these documents and claims completion of the work. In practice, however, the best inspection is continuous inspection.

According to AIA contract documents, the architect is not responsible for exhaustive or continuous construction administration. The Guide For Planning Education Facilities (1985) writes that the best way for a school board to insure that the necessary construction administration occurs is to pay the salary of a full-time on-site representative from the architect's firm to perform these functions. If this is not acceptable, the school board can hire a clerk of the works. A clerk of the works insures that the owner has a construction administrator on the premise at the proper times and that the inspections are performed in a manner that

confirms the reported results. He supplements, rather than replaces, the work of the architect's employees.

Hertz (1990) wrote that a third alternative is to employ a construction management firm. Construction management comes in many forms. The construction manager can be brought on board at any number of points in the planning/construction process. It is important that the district not pay double; the work of the architect should not be taken over by the construction manager and vice versa.

McKinley (1991) wrote that one form of construction management actually eliminates the general contractor from the construction process. Instead, the school district itself holds a series of prime contracts with specialty contractors, and retains a firm to handle the construction management duties that were previously the realm of the general contractor. Advocates claim that improvements in construction quality, reduction in costs, and an acceleration of construction schedule ride on a school district's decision to choose construction management over the general contractor approach.

Powell (1987) enlarged the concept of construction management through construction program management. He defines construction program management as:

> The process of professional management applied to a construction program from conception to completion for the purpose of controlling time, cost and quality. (pp. 1-2)

Powell continued, construction management which may be a component of construction program management or a free

standing set of services is defined as:

> A construction delivery method whereby the general contractor is replaced by a construction manager who provides such services on a fee basis. The services provided by a construction program manager are designated under the categories of:
>
> 1. Project management--coordination, administration and communication of the tasks and activities of the project participants.
>
> 2. Cost management--compiling, forecasting and communicating useable project cost information for decision-making status reporting (estimating) for cost monitoring.
>
> 3. Time management--planning, scheduling, and expediting of project activities, status reporting for time monitoring and management of constraints.
>
> 4. Quality control--monitoring and reporting of performance and work products of project participants for acceptability under established standards and corrective actions as necessary. (p. 2)

McKinley (1991) supported the argument for construction management (CM) with the following:

1. Once hired, the CM firm is an agent of the school district.

2. Cost efficiency. It holds an important position for making cost-reduction recommendations regarding materials and systems.

3. Multiple low bids. Each component that normally falls under the general contractor's bid are bid separately.

4. Watch dog. Construction work that does not meet design specifications can be costly for a general contractor, creating a natural inclination to overlook it or place the blame for it elsewhere.

5. Claim reduction. The CM documents each step, thus making it less likely that claims will be filed.

6. Time Savings. All contractors are aware that the CM is tracking their progress. (pp. 12-15)

Another noteworthy benefit is that a school district is generally free to choose its preferred CM firm free of the bidding process. The cost depends on the services provided. Many states establish limits for CM fees.

The downside of CM includes:

1. Control without risk. The CM firm may be financially liable only for its fee and may assume none of the contractural responsibililties of the general contractor.

2. More administrative work. The district may become involved with 20 to 30 prime contractors as opposed to the standard four primes.

3. Costlier bids. All contractors must be bonded and insured. General contractors can often secure the services of minor subcontractors at a lower rate.

4. Floating cost. Under the traditional approach, most costs are known at the time of the bid opening. Under the typical CM approach, several contracts do not go to bid until well after the project has begun. (McKinley, 1991, pp. 12-15)

In reality, most small and medium size districts cannot afford the services of a CM. Thus, the traditional approach of relying on weekly inspection by a field representative of the architect plus weekly or bi-weekly job meetings, will become the rule of thumb. If this is the situation, it is imperative that the superintendent or a designee familiar with construction perform duties similar to the clerk of the works concept. This person(s) will be on site daily at varying times, observing, taking notes, and even photographing progress. This individual has no authority

The individual(s) during the inspections must be familiar with established construction practices and must be able to read and interpret architectural blueprints and specification documents.

Under normal architectural contracts, the architect, structural engineer, electrical engineer, mechanical engineer, and the architect's field representative make inspections. The structural, mechanical, and electrical engineers will only inspect during construction phases involving their specialities. The architect will attempt to visit the site once every month or two.

Therefore, the "eyes" of the consultants and engineers turn toward the architect's field representative. This individual will spend hours each week inspecting the work that is in progress. He checks the detailed sections of the prints and the specification documents to assure that the contractors are constructing the facility as per plans and specifications. In addition, he inventories the arrival of the materials delivered to the site and estimates the percentage of completion of various construction components prior to the architect approving the payment request.

It is highly recommended that the district superintendent or his designee accompany the architect's field representative for the following reasons: (1) points out areas of concern that have developed since the field representative's last inspection, (2) sees the construction progress through the eyes of this professional (helps the

superintendent to answer questions from the board and the community), (3) increases the superintendent's knowledge, therefore, helping him to do a better job of performing his daily inspections (be able to more accurately report the progress of the project to the board and to the community), and (4) constant visibility does not go unnoticed by the foremen of the various contractors.

A detailed field report needs to be completed each time the field representative or engineer visits the site. These reports need to be initially sent to the architect for his inspection. They then need to be shared with all the affected contractors and the district superintendent. The superintendent needs to file these reports for future reference.

In addition to the inspections by the architectural firm, state and/or local building inspections will occur in the area of structural, electrical, fire and safety, etc., at regular or invited basis (requirements vary from state to state). Often, state codes require an inspection at key points. These inspections must occur prior to continuing the next stage of construction. No field reports are made by the state inspector. If the inspection is satisfactory, the inspector will sign off on the construction permit or a form especially designed for this purpose. If the inspection uncovers deficiencies, the inspector will "red flag" the deficiencies. Work cannot continue in areas of deficiencies until corrected and reinspected.

Job Meetings

Job meetings need to occur on a regular basis. They may need to occur weekly through the major construction phases.

All contractors actively involved with the construction at that point and contractors whose participation will begin shortly need to be represented at each meeting as well as the representatives of the architectural firm and the school district. State/local inspectors will not join these meetings unless they have a report/request to make. Occasionally, a representative from a utility company, a village or county government, or other individual may be invited to attend.

Usually, the contract of the general contractor or construction manager requires that they conduct the meeting. They are also responsible for circulating the "minutes" of these meetings.

Common format involved: (1) A review of the previous job meeting. Each contractor has the opportunity to respond to his part of the minutes. (2) The general contractor will address their current status and layout a timeline for the completion and starting of components. The general contractor will allow each of his subs to respond to their progress and projections. (3) Each prime contractor will have the same opportunity as the general contractor. The contractors can inform the field representative of material that has arrived on the job so he can note such during his inspection. (4) The owner will update the progress of

payment request, change order approvals, and special concerns. (5) The architect's field representative (including the various engineers) will report, ask questions, and make suggestions or demands. In addition, the field representative can review his last inspection. (6) The job meeting ends with a modified short term projection of construction activities about to be started or finished during the time prior to the next scheduled job meeting.

Change Orders

Change orders can occur if the architect or engineer omitted on the approved design factor(s) that requires correcting. Often, the owner initiates a change to the original plans. Boles (1965) points out that change orders are expensive, because the contractor normally calculates at least a 15 percent overhead charge and a 10 percent profit charge. Often, a prime contractor will tack on a 5 percent or more profit charge to the cost of their subcontractors.

All change orders should be prepared, signed and dated by the architect. (Ohio's state building assistance program required four copies produced). These copies are forwarded to the contractor for signature, then forwarded to the board of education for the president's signature. The board of education must, by resolution, approve the change. According to Ohio Revised Code 3318, participants in Ohio's school building assistance program forward all signed copies to the State Department for the State Superintendent of Public

Instruction's signature. The building assistance division retains one copy and mails a copy to the district, the contractor, and to the architect.

Payments

Payments to contractors are commonly made on a monthly draw basis. The Guide For Planning Educational Facilities (1985) states that contractors are required to break out material and labor estimates for each component of the contract shortly after their base bid has been accepted. The contractor submits to the architect on a monthly basis the percentage of material that has been delivered and the percentage of labor that is completed for each component. The architect verifies that each request is reasonably accurate and attaches a certificate of payment if the request is approved. The request is forwarded to the school district where the request is approved by the board prior to the treasurer issuing a check.

It is common practice to retain a percentage of each request until that contractor has completed the project. According to Ohio Revised Code 3318, districts participating in Ohio's building assistance product retains 8 percent of the first 50 percent of the contract (totally 4 percent) until completion of the project. When the project is essentially finished, the architect may release a percentage of the retainage. Retainage for each contractor is placed into a specific bank account. The funds are invested and the interest earned remains with the account. When the project

has been accepted by the district, the interest and remaining retainage is released.

Building Activation

Building activation refers to that transition period when the construction has or is nearing completion, but prior to the building being placed into service.

During this period, the Guide For Planning Educational Facilities(1985), points out that individual pieces of equipment, as well as entire systems, are tested to make sure that they are working as the design and specifications intended. In addition, various systems of the building, such as the mechanical, electrical, cafeteria, etc., are checked to assure that they function together. Heating, cooling and plumbing systems should be drained and thoroughly cleaned after activation, then refilled for operational use.

The district's key maintenance individuals are in-serviced, "checked-out" on the operation and in some instances, the maintenance of the equipment. Often, warranties will begin after activation. This process can provide records of performance showing both the efficiency and deficiency of equipment. This establishes a reliable data base for future references.

Punch List

According to Boles (1965), when a contractor determines that his portion of the project is completed, he notifies the architect in writing. The architect and/or his field representative, along with the owners' representative(s),

check thoroughly the work of that contractor. All items that do not pass this inspection are placed on a list. The contractor then uses this list to find and correct the deficiencies. Years ago, these items were placed on cards, which when corrected would result in the inspector punching a hole in the card, thus the term punch list. Once all the items have been corrected to the satisfaction of the architect and owner, the contractor has completed his work.

Dedication

Herrick, McLearn, Clapp and Bogner (1956) said,

> The successful completion of a new building is achieved only through the efforts of many people, who frequently serve without compensation or who add this service on top of an already heavy work load. This is particularly true when the building has been planned cooperatively with many school employees and citizens participating. Words of appreciation publicly expressed are certainly in order, but they must be sincere and not unreasonably profuse. The occasion for the open house program, or any of the usual means of mass communication in the community may be used. (p. 52)

The dedication ceremony needs to be structured to recognize at least the following: (1) the current and former board of education members who participated from the beginning of the project, (2) community members of various committees who played a role in the development of the facilities, (3) state elected officials who represented the district, (4) county and locally elected officials, especially the ones who were called upon to assist the project in one way or another, (5) representation from the State Department of Education, including representatives from all intermediate educational agencies, such as county offices

of education, (6) representatives from the architectural firm, (7) consultants who participated in the planning, (8) administrators and staff who contributed in various planning or design stages, (9) representatives from the contractors who participated in the construction of the project.

A chance to make short comments should be provided to members of the board of education, state department officials, elected representatives from the state level, the architect and general contractors during the formal program portion.

A civic group may be recruited to serve as guides for the open house immediately after the dedication ceremony. The dediction ceremony could involve the school board, VFW post, scouts, etc., prior to the formal dedication program. A volunteer group could serve as hostess for punch and cake during the open house.

According to Boles (1965), a dedication program booklet should be developed that:

> Is likely to contain a general statement concerning the nature of the educational program to be housed in the facility; a note about the name of the building and what it represents; the order of events for the formal program of dedication; data (perhaps including the names of contractors, architects, and school officials currently in office); photographs; and a floor plan. (p. 236)

## Equipping the Facilities

The Guide For Planning Educational Facilities (1985) states:

> The main objective in equipping a facility is the enhancement of the educational program. The quality of furniture and equipment could well be proportionate to the quality of teaching and learning that will be possible. (p. J2)

The Guide For Planning Educational Facilities (1985) also suggests:

> Elementary and secondary schools will normally require from 15 percent to 25 percent of the projected construction budget--the development of the furnishing budget early in the planning is imperative. (p. J4)

Engelhardt, Engelhardt, and Leggett (1956) categorized equipment into five categories:

1. Fixed--lighting, heating, plumbing, etc.
2. Fixed other than integral parts of the building--kitchen equipment, machines, lab tables, etc.
3. Built-in equipment not requiring any utility connections--bookcases, cabinets, etc.
4. Stationary equipment--auditorium seats fasten to the floor, etc.
5. Movable equipment requiring few if any utility connections--portable lab units, desks, chairs, etc. (p. 145)

Generally, electrical wiring, light fixtures, trim, heating and ventilation systems, ceiling tile and plumbing fixtures are virtually always included as part of the construction contracts. In addition, chalkboards, tackboards, display cases, recessed floor mats, etc., are normally included in the base bids.

Other categories of equipment (kitchen, library, science, industrial arts, etc.) are usually bid through separate contracts. The developmentof the specifications on these special areas is often postpond until all the work

necessary to get the construction phase started has been completed. Timing the specification development and going to bid is very important so these items can arrive after the construction is completed, but prior to the anticipated use of the facilities.

Boles (1965) points out that considerable time needs to be allocated to study catalogues, manufacturers literature, attend exhibits, and listen to presentations of sales representatives. Visits need to be made to schools where the actual furniture is in use prior to making any final selection of furniture and equipment that will serve as models for preparing specifications. The architect should be retained to assist or at least review the equipment selected. The architect is best qualified to check for interference between equipment and construction elements and to reconcile conflicts. The architect should also check compatability of color, size, etc., with the design of the facilities. Specifications need to be written for each item to be purchased. The specifications should include the quantities required, dimensions or sizes, materials, color, and details of the quality or craftsmanship expected.

One bidding technique is to make each item a stand alone bid item. Vendors list their lowest price for each specified item. The owner can pick and choose from the bids based upon price, quality, and compatability with the facility. The downside of this technique is the tremendous amount of time required to analyze the bids, check for compatability,

process contracts and resolutions, schedule deliveries, inspect the equipment upon arrival and pay the suppliers.

The Guide For Planning Educational Facilities (1985) lists ten factors to consider when developing the loose equipment specs. They are:

1. Appearance--they should be attractive in terms of color, form, and texture and should contribute to the beauty of the environment.

2. Flexibility--movability, adjustability, and multi-functionalism are important characteristics

3. Safety--furniture and equipment should be fire retardant and should not produce toxic gases or smoke should they burn. Corners, edges and hardware should be designed to prevent injury. All edges should be rounded. Where the young user could lick or chew objects, materials and finishes should be non-toxic

4. Durability--items need to be tested under use conditions.

5. Maintenance--low maintenance requirements and a source of replacement parts that can be easily obtained are desirable.

6. Comfort--scale, texture, form, light reflection, and adjustability are important considerations.

7. Building codes--many states have minimum standards of design.

8. Guarantees--some items will be guaranteed for the life of the building, other items may carry no guarantee at all.

9. Cost--the long-term expense of operating and maintaining furniture and equipment is more critical than their initial cost.

10. Services of the manufacturer and/or distributor--the supplier should be close enough to the school to provide service in a reasonable amount of time. References should be checked. (pp. J2-4)

Boles (1965) provides the following guidance when accepting deliveries:

Provisions relating to delivery should be written into the "general conditions" of the specifications, and should include:

1. An indication of the approximate time that delivery will be expected

2. A provision that actual delivery not be made until receipt of written confirmation of a date on which it will be acceptable

3. A clause making it the shipper's responsibility if delivery is attempted without confirmation

4. Indication of who has authority to receive, inspect and acknowledge deliveries

5. Provision that the supplier must unload, distribute, unpack, assemble, install, and connect all items requiring those services (or that he pay for the services if provisions are made locally for them to be done)

6. A stipulation that the supplier must remove all packing, crating, and so on, from the premises. (pp. 196-199)

Occupancy

The transition from the previously used buildings to the new facilities requires considerable pre-planning and coordination. The following outline was prepared by the Tri-County North Transition Action Team (1990). The plan went into action during the last week of school (note: Tri-County North Local School District, Lewisburg, Ohio, had two weeks after the second semester to move all educational materials and equipment that was going to be used in the new facilities from their existing three buildings. A loose equipment auction was scheduled two weeks after school was out for the summer. Two weeks after the auction, demolition of the old buildings began).

A. Packing and moving of educational materials, textbooks, library books, and office supplies.

1. Packing materials into standardized book sized boxes donated by Lewisburg Container. Each teacher and secretary is responsible for packing his/her own materials.

2. Each teacher/secretary will label each box by the room number where the boxes are destined to go in the new facilities (room assignment for the fall semester has been made and distributed).

3. Custodial staff and temporary sub-custodians will load boxes into pick-up trucks and deliver to the assigned room. Not all rooms/areas have been released by the general contractor. Verify availability of rooms prior to loading boxes. Material/boxes assigned to rooms not completed will be stored as per instructions of Bill Kesling (head custodian).

4. Teachers will be paid up to two days (15 hours) at the sub-custodial rate for unpacking and arranging their classroom materials. Time needs to be verified by the appropriate principal. Time paid beyond 15 hours needs to be approved in advance by the superintendent. (Examples: Librarians, science teachers, band/music, P.E./athletic).

5. Principals will notify each teacher when loose equipment has arrived and installed. Anticipate unpacking during the last week of August.

B. Athletic/physical education equipment

1. Packed and labeled under the direction of the athletic director.

2. All boxes will be temporarily stored in C119 pending completion of the athletic storage areas.

C. Copy machines/pop machines

1. Will be moved by vendors

D. Kitchen equipment

1. Packed, moved, and unpacked by cooks under

direction of the head cook.

E. Vocational agriculture and industrial arts equipment

1. Items that will be kept will be temporarily stored in the basement of the multi-purpose room.

F. Trophies, pictures, plaques, etc., that will be kept

1. Packed and stored at the district office

G. Custodial supplies, restroom supplies, and maintenance supplies

1. Stored temporarily in basement of multi-purpose room

Note: All educational materials, supplies, and equipment must be removed by June 8, 1990, three days prior to the auction.

Boles (1965) identifies the following areas that should be addressed when occupying new facilities:

1. Instruction needs to be planned for all who are to use the new facilities. Instruction may be both written and oral, formal or informal, may be in the form of manuals or handbooks. The process needs to identify who to report any problems or deficiencies with the building or equipment. Provisions for the health and safety of the students need to be made (tornado safe areas and fire drill exit routes). Relationship of certain building areas such as which restrooms to be used when in certain areas of the building.

2. Tours needs to begin with the administrative staff. The administrative staff needs to prepare for small group staff tours. Tours can be scheduled for students prior to and on the first day of classes. Include a layout diagram of the facility when giving tours.

3. In-services--in-services will be required prior to the use of new equipment. Examples are the telephone system, P.A. system, the security system, the fire alarm system, keying arrangement, set point adjusting of the HVAC, and new technology equipment. In-services should be limited to one

> topic at a time with a chance for hands-on experience immediately after the instruction. Some groups of employees will receive specialized in-service, such as the cafeteria workers and custodians. Custodians should receive in-service in such areas as care of the floor tile, carpet, gym floors, electric switch box information, HVAC controls, supply storage areas, and expectations for cleanliness. (pp. 210-225)

All of the "settling in" factors dealing with teachers and students should be able to be accomplished in two days prior to the first day of school and with specifically planned activities during the first week of school.

Several factors involving the custodial, secretarial, and cafeteria staff should be planned several days prior to the teaching staff appearing on the scene. Many of the systems involving these school workers will require shakedown operations that are both instructive and necessary to determine if the systems are going to function as planned. (Boles, 1965, pp. 210-225)

The Guide For Planning Educational Facilities (1985) breaks the occupancy phase into two main categories. They are the user orientation programs and public information programs. The first is directed at the needs of persons who will work and use the facility. The second is intended to promote familiarity with the school as a community resource.

Stewardship toward the new facility needs to be stressed on all tours, in-services, and instructional programs.

The Guide For Planning Educational Facilities (1985) lists the following activities for informing the public about the purpose of the school and its unique design features:

1. Develop media features (newspapers, articles, radio or television program) that discusses and illustrates the new educational facility.

2. Develop brochures with maps, photographs and text that briefly explain the design and educational concepts.

3. Schedule open house or tours conducted by students who have been briefed about the building and its relation to the educational program.

4. Develop printed material for distribution to visitors interpreting the new facility and program. The best of these handouts include photographs, cost information, design history, and explanations of special features and equipment. A building plan and a succinct explanation of various educational programs can be included. Documentation of planning considerations related to building and site are also important. (pp. 03-5)

## Post-Construction Evaluation

Although post-occupancy evaluation has no definite methodology, it is an important activity and an essential part of the total construction project. This evaluation process once started needs to be continuous into the future.

A post-occupancy evaluation should be made within 12 months after the project is completed. Gayner (1989) recommends "a walk-through with the architect to evaluate the functioning, appearance and other aspects of the new building." (p. 52)

Boles (1965) stated that the evaluators must:

1. Identify evidences that the objectives of the component are being achieved.

2. Focus on how to bring about desired changes.

3. Explain to all persons involved what is being attempted and why.

4. See whether what was planned is being carried out.

5. Record evidence of achievement of objectives, judging whether overall achievement is satisfactory in kind and in degree. (p. 215)

Boles also said that "the real test of the building and site may be whether the building allows the curriculum to change as needed (p. 236)."

The Guide For Planning Educational Facilities states:

> the evaluation provides an opportunity to obtain information that can be used to improve the planning and construction of future education facilities. A school building's effectiveness is measured by how well the facilities provides for the numerous and diversified teaching and learning activities that take place within it. The information obtained through a post-occupancy evaluation can provide valuable information to:
>
> 1. Determine how successful the planning of the school building has been.
> 2. Determine how well the building responses to the educational specifications and the on-going educational program.
> 3. Identify changes in the planning process that might be required and a plan to implement them.
> 4. Identify particular features of the building that should or should not be repeated in future projects.
> 5. Determine the success of the design and construction elements.
> 6. Identify and plan corrective measures for the school building being evaluated. (pp. 05-6)

Preventative Maintenance/Maintenance Programs

Strevall (1972) believes that the preventative maintenance program begins during the planning stage of a new construction project. He mentions the following components need to be thought through during the planning stage:

1. Keep windows to a minimum for fuel conservation, cleaning, and vandalism repair costs.

2. Invest in good hardware and standardize the components, thus reducing the number of different spare parts required to be stocked.

3. Use glazed tile and terrazo in the restrooms. Install floor drains.

4. Install floor drains under each water fountain.

5. Install sidewalks where people walk. Some sidewalks may be best left out until the traffic patterns are set.

6. Require the architect be responsible for providing a list of subcontractors and products used during the construction phase.

7. Secure all the operational manuals for equipment that is installed.

8. Insist upon receiving the recommended training and in-service programs that the contract requires.

9. Design plenty of custodial closets.

10. Provide plenty of hall electrical outlets. (pp. 77-78)

According to Weber (1971),

> There are two concepts that prevail in the general maintenance field and they often clash. They are corrective maintenance and preventive maintenance. The first attitude emphasizes dealing with problems after they occur and is a necessary element in any adequate maintenance program. When the corrective approach comprises the institution's total program, as it often does when budgets are anemic, it quickly leads to crisis maintenance which in the long run is the most expensive kind of program.....preventive maintenance emphasizes finding and fixing potential problems before they disrupt building operations. Although a good preventive maintenance program requires an initial outlay of time and money for proper organization, it usually returns the cost many times by minimizing potential damage, reducing emergency overtime work and eliminating expensive rush purchasing. A preventive maintenance program can support, but never supplement a corrective program. (p. 77)

Cary (1991) adds a planned maintenance concept to educational facilities which has been used for years in

manufacturing facilities. He states:

> Planned maintenance is a mind set. It is a program in which the wear and tear on the school and its equipment are monitored and corrected before a breakdown can occur. A key part of the program is recognizing which units and major components should be monitored. All items should not be included...planned maintenance may be viewed on a continuum encompassing:
>
> 1. Preventive maintenance
> 2. Routine repairs
> 3. Major component replacement
> 4. Renovation
> 5. Modernization (p. 22)

Cary (1991) generalized that preventive maintenance tasks are performed on a planned schedule based upon manufacturers or trade recommendations. Preventive maintenance normally includes lubricating, checking for proper operation, adjusting and aligning, and identifying items to be repaired or modified.

Routine repairs include replacing or repairing broken items. Often, these items are so inexpensive that it is not worth the time and expense of placing them on the preventive maintenance program.

Major component replacement usually occurs when it is no longer cost effective to continue to repair, or, a new product has entered the market place that makes the changeover cost effective.

Renovation refers to the minor modifications of existing spaces, usually to improve the safety of students or to adjust to a changing curriculum.

Modernization is a major project that attempts to bring the entire facility up to current building standards.

(Carey, 1991, pp. 22-25)

The creation of a preventive maintenance program is highly technical. It is not something that can be delegated to a principal or head custodian. A new or renovated school project should be able to draw upon the architect, engineers and other consultants who designed the facilities for a list of items requiring preventive maintenance. According to Castaldi (1977), the basic question to each one of these experts should be, "What can I do on a regularly scheduled program to extend the life of each piece of major mechanical equipment, and to preserve the physical properties and function of the building itself (p. 412)?"

Items that need to be included in a preventive maintenance program, according to Castaldi are:

1. The list of tasks to be performed with description in detail.
2. The frequency and nature of the work; are clearly stated.
3. The materials to be used; specified in considerable depth.
4. The manner in which the work is to be accomplished is expressed in simple language. (p. 412)

A sound maintenance program must be based on reliable past information derived from several sources if future budget projections are going to realistically reflect the maintenance needs. An Ohio State Plant Maintenance Handbook (1970) suggests that future maintenance needs can be predicted by:

1. Maintaining records of recurring projects

a. Labor costs
b. Material costs and source of supplies
c. Difficulties encountered

2. Maintenance request from building personnel

a. Principals and teachers
b. Operational personnel

3. Periodic maintenance surveys conducted by qualified personnel using a planned survey check list.

a. Supervisory personnel
b. Architect or engineer
c. Principals
d. Head custodian (p. 31)

Smith (1991) reports that,

> A good work order system can ensure organized and efficient maintenance operations throughout a school district. (p. 18)

Smith suggests that a work order form needs to fit in a person's shirt pocket. It needs to be printed on a three-part carbonless paper.

The form needs to contain the following information: location, original date, principal's name, date received by the maintenance department, job description (explaining what work is needed), originator's signature, principal or maintenance supervisor's signature.

In addition, a section needs to be included for the maintenance people that includes the cause of the problem, items used to repair and their cost, time required to repair the problem, the name of the individual who repaired the problem, and the date and time the repair was made.

Castaldi (1977) also wrote,

> The maintenance plan...can be made more cost-effective through the use of a district-wide

> computerized data based management system. In addition to providing a list of items needing preventive maintenance at certain specific times, a computerized building file can generate a wide variety of up-to-the-minute reports on matters related to the maintenance and operation of the building. A district-wide system can project maintenance costs within specified categories and allocate such costs to each educational facility in the school district. It can generate current information on the inventory and rate of consumption. (p. 412)

In addition, Borowski (1984) states,

> The installation of a space and equipment inventory system improves the use of resources and offers a wealth of information for the management of these resources. (p. 18)

Bohl (1974) suggests it is sound economy for the board to defray cost for key custodial personnel to attend courses and institutes in building maintenance in the same manner the board provides support for instructional staff.

Traditionally, principals have been in charge of the custodial, and, to some degree, the maintenance staffs of their buildings. This responsibility has taken principals away from their primary attention to academic matters.

Lewis and Lamay (1991) wrote about an enpowerment plan that makes the maintenance management team more responsive and in the process, attains high quality results in a cost-effective manner. The plan changes the administration hierarchy from supervision by the principals to a supervisor(s) that answers directly to someone on the central office level. Lewis and Lamay feel that this plan adds consistency across the district in the manner in which buildings are cleaned, maintained, and serviced.

Under this concept, principals no longer supervise or evaluate custodial/maintenance personnel assigned to the building. However, they do provide evaluative input concerning (1) relations with staff, students, and community, (2) personal hygiene, grooming, and dress, and (3) demonstrated performance which indicates cooperation, initiative, desirable attitude and responsiveness.

The overriding goal of the 1990's will be "do more with less." Sustaining a quality preventative maintenance program will become increasingly more expensive as salaries, insurance, and other fringe benefits continue to increase.

Unfortunately, in many districts, changing a job description or staff assignment involves a complicated set of procedures that at best is time consuming on the part of the management team and at its worse, results in grievances, arbitration, and even litigation.

These realities are forcing districts to budget more of their scarce resources into legal, negotiations, and management costs.

Fenster (1991) wrote that there are three basic choices for providing a high quality school maintenance program. They are:

1. Operate physical plants in the traditional manner.
2. Employ a Contract Management Service Provider (CMSP) to manage the plant.
3. Combine a traditional approach with a mixture of assistance from consultants and contractors. (p. 8)

Fenster continues:

Whichever method is chosen, school administrators must find viable solutions to the vexing operational issues of the 1990's listed as:

1. The growing volume of deferred maintenance (estimated at over $100 billion) which threatens the capital investment in schools.

2. The spiraling costs of new construction and renovation projects.

3. The escalating costs of energy.

4. Increasing labor and supply costs. (p. 8)

He suggests school districts explore concepts of employing a Contract Management Service Provider (CMSP) to manage the plant. A quality CMSP will provide a district with the following benefits:

1. A professional manager trained to properly utilize the computerized maintenance management system.

2. A software package customized to the district's needs.

3. A national database of standards for all equipment that defines what must be done and how long it should take.

4. A broad base of technical expertise that is electronically accessible.

5. A program that is results oriented. (p. 10)

In addition, a CMSP should have the tools and experience to recruit and train the right people to address the maintenance concerns of new, high-tech school equipment. The CMSP service can also include the maintenance of photo copiers, central computer systems, fax machines, personal computers, VCR's, TV monitors and other audio-visual equipment. As providing a comprehensive maintenance agreement to support new systems have become increasingly

more complex, time consuming, and costly, a quality CMSP, using a holistic approach to the technical environment, can provide a custom-tailored program blending the following:

1. On site management and maintenance services
2. Vendor service agreements
3. Time and material contracts
4. Maintenance insurance

Managing the increased cost of regulatory items involving the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA), and the Department of Health and Human Services (HHS) is another factor that has forced some management teams to look at CMSP's. (Fenster 1991, pp. 8-13)

On the other hand, Viscio (1991) strongly states that a well run in-house department has many advantages over a contract cleaning service. He feels that in-house staff develops ownership that increases the longevity of furnishings, building, grounds, and equipment. He suggests that districts that are considering going to CMSP to eliminate labor and administrative time and costs need to analyze if there is a positive relationship between the administration and the buildings and grounds staff:

Viscio suggest that:

> A positive relationship between the administrator and the buildings and grounds superintendent is important for the growth and well being of the institution. If this relationship is weak and lacks direction, the total operation suffers. Without an honest and sincere delegation of both authority and responsibility from

> the administrator to the building and grounds superintendent, the relationship falters. (p. 9)

Following are some points that the building and grounds superintendent should consider according to Viscio:

1. Do you tell your people they are doing a good job?
2. Do you have meetings with your staff and administrators?
3. Do you inspect your premises from time to time with your staff or administrators?
4. Did you help prepare your budget?
5. Do you know how you stand in your budget from month to month and quarter to quarter? (pp. 8-13)

Dunklee (1989) reports that a well organized, documented, and administrated preventative plan is an absolute necessity to lessen unnecessary and costly litigation. He states:

> Most courts state categorically that because a school district holds, manages, and maintains property and equipment, the district is accountable for damages that result in injury to a person or for damage to the property of others from the school district's improper maintenance, mismanagement, or negligence. Almost every piece of equipment, including furniture, that has not been properly maintained has been a basis for litigation over the past few years. (p. 25)

## CHAPTER III

## DESIGN AND METHODOLOGY OF THE STUDY

This chapter describes the research design and methodology of the study. Focusing upon the districts that participated in Ohio's School Building Assistance Program from 1983 through 1990, the study attempts to determine congruence with a School Facility Construction model that was developed after an analysis of the school facility construction literature.

### Research Design

The School Facility Construction Model was developed after a comprehensive review of the literature related to planning, designing, and construction of school facilities. The literature ranged from articles by leading school designers, major authors on school construction, to materials disseminated by the Council of Educational Facilities Planners, Inc.

A descriptive retrospective survey research design also was selected to access actual school development and construction practices in Ohio's School Building Assistance Programs in relation to the model. Fox (1969) stated,

> In educational research there are two conditions which occurring together suggest and justify the descriptive survey: First, that there is an absence of information about a problem of educational significance, and second, that situations which could generate that information do exist and are accessible to the researcher. (p. 424)
>
> The retrospective survey involves a research question oriented to the past, its basic premise is that this is a question about the past for which no data is known to exist. Therefore, the researcher seeks out persons

> who are alive (involved) during the period in which he is interested, and ask them to recall the specific circumstances he wishes to study. The retrospective survey is based upon the analysis of data collected at some time after the period or event under study. (p. 430)

Methodology

Because of the need for an extensive description of the school districts' experiences in the School Building Assistance Program in order to determine the extent to which there was congruence with the model, interviews were conducted with each district. Only through comprehensive description of specific aspects of the process could congruence be assessed. Consequently, the interview method was selected.

Borg and Gall (1983) stated,

> The interview as a research method in survey research is unique in that it involves the collection of data through direct verbal interaction between individuals. The interview permits the research worker to follow up leads, and thus, obtain more data and greater clarity. (p. 436)

Galfo and Miller (1970) identified three types of interviews. They are (1) interviews with schedule, (2) structured interviews, and (3) unstructured interviews. In this study, an interview schedule was developed based on the school facility construction model. However, the unstructured interview technique also was utilized to clarify and extend the responses from the interview schedule.

The Population and Sample

The population consisted of 13 school districts funded under the Ohio School Building Assistance Program from 1983

to 1990. All 13 superintendents from these districts provided data for this research project.

Interview Format

All members of the population were contacted by telephone and consented to scheduling an interview. Each interview was scheduled for 90 minutes. All interviews took place between January 21 and February 26, 1992. If congruence to the model was uncertain, follow-up questions were asked immediately.

Summary

A descriptive retrospective research design using an interview methodology was selected. All superintendents employed by districts participating in Ohio's School Building Assistance Program from 1983 through 1990 were included in the sample. A set of interview questions was developed. However, follow-up questions were asked to clarify congruence to the school facility construction model.

# CHAPTER IV

# SCHOOL FACILITY CONSTRUCTION MODEL

## Introduction

Based upon the literature, the following model was developed employing appropriate elements from the sources researched. Following the illustrated model are narrative guidelines.

## Model

The process of coordinating a school construction project from start to finish is a complex undertaking that has several key, and occasionally, overlapping stages. The key to maximizing a project's investment is the systematic ordering of events. The model breaks the process into planning, designing, contracting, construction, equipping the facility, occupancy, post construction evaluation and preventative maintenance components. Figure 1 depicts the elements in the School Facility Construction Model. Figure 2, entitled "School Facility Construction Model Sequence Chart," elaborates on the sub-components of each element.

FIGURE 1

SCHOOL FACILITY CONSTRUCTION MODEL ILLUSTRATION

FIGURE 2

SCHOOL FACILITY CONSTRUCTION MODEL SEQUENCE CHART

| PLANNING | DESIGNING | CONTRACTING | CONSTRUCTION |
|---|---|---|---|
| 1.0 Planning | | | |
| 1.1 Community & current facility/ program analysis | | | |
| 1.2 Determining the planning process | | | |
| | 2.0 Designing | | |
| 1.3 - - - - - | 2.1 Selecting the architect | | |
| 1.4 - - - - | 2.2 Selecting the educational spec writer | | |
| 1.5 - - - - | 2.3 Developing educational specifications | | |
| 1.6 - - - - | 2.4 Selecting & securing site(s) | | |
| | 2.5 Considering construction options | | |
| | 2.6 Schematic design phase | | |
| | 2.7 Design development phase | | |
| | 2.8 Construction documents | | |
| | | 3.0 Contracting | |
| | | 3.1 Advertising & bidding the project | |
| | | 3.2 Receiving, tabulating & analyzing bids | |
| | | 3.3 Awarding and execution of construction contracts | |

| PLANNING | DESIGNING | CONTRACTING | CONSTRUCTION |
|---|---|---|---|
| | | | 4.0 Construction |
| | | | 4.1 Ground breaking |
| | | | 4.2 Construction administration |
| | | | 4.3 Inspections |
| | | | 4.4 Job meetings |
| | | | 4.5 Change orders |
| | | | 4.6 Payments |
| | | | 4.7 Building activation |
| | | | 4.8 Punch list |
| | | | 4.9 Dedication |
| | 2.9 - - - - | 3.4 - - - - - | 4.10 - - - - - (is connected to 5.0) |

| EQUIPPING THE FACILITY | OCCUPANCY | POST CONSTRUCTION EVALUATION | MAINTENANCE PROG. |
|---|---|---|---|
| 5.0 Equipping the facilities (these items can also be selected in 2.9, 3.4, & 4.10) | | | |
| | 6.0 Occupancy | | |
| | | 7.0 Post construction evaluation | |
| | | | 8.0 Preventative maintenance/ maintenance program |

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## Narrative Description

The model illustrated in Figure 2 outlines the basic components of a school facility construction project. The narrative description below expands upon the basic steps contained in the model.

### 1.0 Planning

The board of education determines the planning process. Identification of planning resources takes place at this time. Planning resources include persons from the local, state, and national levels. Persons identified should include representatives of the faculty, student body, administration, community and the state department of education. Other individuals may include the district's architect, legal council, bond council, university and other paid consultants.

### 1.1 Community Analysis

Factors to be analyzed include any changes in political boundaries; patterns of land usage including residential, commercial and industrial; condition and value of housing in residential areas; existing and possible new highways and main streets; population changes, both in-migration and out-migration; and changes in socioeconomic patterns resulting in population shifts within the community; also availability of community services such as libraries, recreational areas, health services and public assembly spaces; vocational and higher educational opportunities in the community or area; parental expectations of the schools;

citizen attitudes and aspirations in general. In addition, the community's history, current status, and projected changes need to be analyzed.

1.2 Determine the Planning Process

The planning process can be board/superintendent driven, ad hoc committee driven or driven through a community/board strategic planning process. Facility experts recommend a combination of two or all three of the above planning processes be used during the course of the entire project. An important aspect of the planning process is planned visitations to those schools that are recognized to be exemplary in instruction, space needs, economical operations, and community support.

2.0 Designing

The design phases consist of selecting the architect, selecting the consultant to write and develop the educational specifications, selecting and securing site(s), construction options, the schematic design phase, the design development phase, and the preparation of construction documents. The community must be kept informed and involved through each of these steps.

2.1 Selecting the Architect

A well defined employment interview plan should be developed for the selection of the architect. The interview questions should reflect what the planning committee has agreed upon in regard to the needs, wants, and desires for the school. After the questions are developed, it should be

assured that each person on the interview team follows the defined process completely and maintains a decorum of both professionalism and confidentiality.

The interview team should visit a minimum of three (3) schools designed and constructed by those architects who make the "short list."

After the selection process is completed, a written contract between the board and the architect is completed. This contract establishes the architect's specific duties and the basis for payment for services rendered. The standard AIA contract form takes care of the architect's equity and interest and provides blank spaces for the school board to insert stipulations that are in their own interest.

2.2 Selecting the Educational Specification Writer

The board of education should secure the services of a consultant who can work with the professional staff, students and citizens in drafting the educational specifications. The same extensive steps need to be followed as in the selection of the architect.

2.3 Developing Educational Specifications

A good set of educational specifications describes briefly and clearly the activities to be housed, nature of the people involved, spatial relationships of the school plant to site, interrelationships of one instructional area to another and to the non-instructional areas, equipment and furniture to be housed, and any special provisions which deal primarily with environmental conditions of the school plant.

The educational specifications should include all the information about the program that will assist the architect in designing the facility. Classified and certificated staff, administrators, students, the architect, and the planning committee should be given the opportunity to provide input into the educational specifications.

2.4 Selecting and Securing Site

The committee for site selection should develop criteria for the selection. Possible criteria include size and shape, nearness to center of population, accessibility, availability of utilities, cost, environment, topography, suitability for construction, proximity to other educational and recreational facilities, and safety factors. The architect should be available to aid in the selection of a site.

2.5 Considering Construction Options

The design selection and the funds available will influence the architect regarding types of basic construction necessary to accomplish the goals set forth in the educational specifications. The project could take the one-at-a-time approach, a system approach, a prototypical design approach, or any combination of the various alternatives.

2.6 Developing a Schematic Design

The architect, after studying the educational specifications and the selected site information, develops preliminary diagrams and sketches to illustrate various

solutions to the space requirements. The board of education, and possibly an ad hoc committee, will assist the architect in evaluating the potential of various proposed diagrams and sketches. The architect needs to be able to provide a computer analysis of space as per the planning team request. During this period, the architect performs a cost analysis and calculates an estimate.

2.7 Completing the Design Development Phase

The architect refines and develops detailed plans of the approved decisions reached in the schematic phase. The design development phase results in a set of plans of sufficient detail to permit further development of plans and specifications for materials, equipment, structure, and construction. The architect must inform school officials of what to expect by reviewing detailed plans and specifications. Changes requested by the school officials can be made more easily and cost effectively before final approval of plans and specifications. At least two months need to be set aside to review this phase. Oversights during this phase will result in costly change orders during construction.

2.8 Preparing the Construction Document

The final working drawings and specifications are generally referred to as construction documents. The documents result from the refinement and expansion of the schematic and design development phases. The final construction documents contain:

1. Complete and detailed working drawings
2. Architectural specifications
3. Complete cost estimates

## 3.0 Contracting

Contracting plans include advertising and bidding the project, receiving, tabulating and analyzing the bids, and awarding the contracts.

### 3.1 Advertising and Bidding the Project

Most states have specific bidding requirements. The advertisements specify where to pick up the plans, the deposit fee, when bids will be opened, and other specific information. Projects can be advertised through newspapers, the F. W. Dodge Corporation, and includes a request of specific companies to bid.

### 3.2 Receiving, Tabulating, and Analyzing the Bids

Only bids that arrive on time and in the prescribed manner should be opened. Tabulating bids can range from being a very simple process to a very difficult and time consuming process, depending on the size of the project, the options bid, the substitutions submitted, combination bids, etc. The analysis phase is where the "lowest and best" bid is determined.

### 3.3 Awarding the Contracts

Resolutions by the board are approved awarding the various contracts. The successful contractors should submit a list of their subcontractors, develop a schedule of progress, and attend a general project organization meeting conducted by the architect.

4.0 Construction

Segments during this phase include a ground breaking ceremony, planning and organizing the construction administration, inspections, job meetings, processing change orders, approving payment requests, activating the project, completing the punch list, and holding a dedication ceremony.

4.1 Ground Breaking

A ground breaking exercise can be used for public relations, thanking individuals, developing community anticipation and excitement, and as a tangible signal that the construction phase is about to begin.

4.2 Construction Administration

Several alternatives exist for administrating the project. Most common forms are on-site inspections by representatives of the architect, a full-time or part-time clerk-of-the-works, and various forms of construction management.

4.3 Inspections

The individual(s) doing the inspections are determined in 4.2. The inspection reports should be in writing and addressed verbally in the job meeting (4.4). The inspector needs to be knowledgeable about the project plans and construction specifications. This person is the "watch dog" of the architect and owner.

4.4 Job Meetings

Job meetings should occur on a regular basis. Large projects should have a weekly meeting. All prime

contractors, subcontractors who are active at this point in time, the architect and the owner participate. Each participant provides an update and projects his progress through the next job meeting. Concerns and problems are addressed during these meetings.

4.5 Change Orders

Change orders have a specific process that will be followed starting with firm cost estimates and being completed when all parties have agreed by signing the change. Often, costs for a potential change order are negotiated or rejected by the architect and/or owner.

4.6 Payments

Normally, the contractor submits to the architect on a monthly basis, a statement indicating the percentage of materials that have been delivered and the percentage of labor that is completed during this period. The architect verifies the occurrence of these requests, makes necessary adjustments, and forwards them to the district's treasurer for payment.

4.7 Building Activation

Individual pieces of equipment and entire systems are tested to make sure that they are working as the design and specification intended.

4.8 Punch List

After a prime contractor has indicated in writing that his portion of the project is complete, a thorough inspection will be made. All items that do not meet the construction

specifications are listed. After every item on the list has been corrected to the satisfaction of the owner and the architect, that portion is ready to be turned over to the owner and the warranty period begins.

4.9 Dedication

The dedication is a chance for the entire community to participate and celebrate the new facilities.

5.0 Equipping the Facilities

Most of the work in this section involves movable equipment such as desks, chairs, tables, etc. The stationary equipment such as auditorium seating and science labs are often included in the design development phase.

6.0 Occupancy

Two major components of this phase are the user orientation programs and the public information programs.

7.0 Post-Construction Evaluation

The evaluation provides an opportunity to obtain information that can be used to improve the planning and construction of future education facilities.

8.0 Preventative Maintenance/Maintenance Programs

Preventive maintenance emphasizes identifying and fixing potential problems before they disrupt building operations. A preventative maintenance program can support but never supplement the corrective maintenance programs.

# CHAPTER V

# CONGRUENCE WITH MODEL

## Introduction

The purpose of this study was to develop a model for school facilities construction programs, then determine if the building programs occurring under the Ohio School Building Assistance Programs were congruent with it. The study was limited to the thirteen Ohio Building Assistance Programs that received financial assistance between 1983 and 1990. An interview guide was developed from the model, which generated data that was used to determine if congruence occurred. Data were collected by means of an open-ended interview technique (see Appendix A).

A panel of experts, consisting of two former and the current Ohio School Building Assistance Directors, was asked to review the questionnaire, the model and the model narrative. These three individuals span the entire length of Ohio's School Building Assistance Program, which began in 1957 (see Appendix B).

The names of the thirteen school superintendents were provided by the Ohio School Building Assistance Program (see Appendix C). The interviewees were assured that the data gathered would not be identified with their name or their district's name. The information gathered during the interviews for each of the thirteen districts can be found in Appendix G.

Four tables are included to provide background data of

the thirteen districts that participated in Ohio's School Building Assistance Program from 1983 to 1990.

Table 1 indicates that the typical district in the Ohio School Assistance Program had student enrollment between 1,000 and 1,200. The ADM range was 900 to 2,350.

TABLE 1

AVERAGE DAILY MEMBERSHIP (ADM) BY DISTRICT

| | |
|---|---|
| Districts with ADM of less than 1,000 | 1 |
| Districts with ADM ranging from 1,001 to 1,200 | 6 |
| Districts with ADM ranging from 1,201 to 1,400 | 3 |
| Districts with ADM ranging from 1,401 to 1,600 | 1 |
| Districts with ADM ranging from 1,601 to 1,800 | 1 |
| Districts with ADM ranging from in excess of 2,000 | 1 |

Source: Interview Background Section, 1992

Table 2 reveals that the typical district office staffing arrangement was a superintendent, secretary, treasurer, and an assistant treasurer.

TABLE 2

DISTRICT OFFICE STAFFING PATTERN

| | |
|---|---|
| Districts that had central office staffs consisting of a superintendent, secretary, treasurer and an assistant treasurer | 7 |
| Districts that had a second assistant in the treasurer's office | 2 |
| Districts that had an assistant superintendent or a federal program coordinator | 4 |

Source: Interview background section, 1992

Table 3 indicates that the typical district had assessed valuation of $40 million to $50 million. The range was $13.5

million to $86 million.

TABLE 3

ASSESSED VALUATION OF DISTRICTS PRIOR TO START OF SCHOOL BUILDING ASSISTANCE PROJECT

| | |
|---|---|
| Within range of $10 million to $20 million | 2 |
| Within range of $20 million to $30 million | 1 |
| Within range of $30 million to $40 million | 1 |
| Within range of $40 million to $50 million | 7 |
| Within range of $50 million to $60 million | 0 |
| Within range of $60 million to $70 million | 1 |
| Above $70 million | 1 |

Source: Interview background section, 1992

Table 4 shows the percent of increase or decrease assessed valuation from just prior to the start of the project through 1991. This period of time ranges from 5 years to 8 years, depending when the project began. The range was from a decrease of 6 per cent to an increase of 37 per cent.

TABLE 4

ASSESSED VALUATION INCREASE FROM START OF PROJECTS THROUGH 1991

| | |
|---|---|
| Decreased valuation of 0% to 10% | 1 |
| Increased valuation of 0% to 10% | 4 |
| Increased valuation of 10% to 20% | 4 |
| Increased valuation of 20% to 30% | 2 |
| Increased valuation of 30% to 40% | 2 |

Source: Interview background section, 1992

The data collected during the interviews is presented and analyzed in the remainder of this chapter.

## Presentation of Interview Data

The interview guide consisted of nineteen questions.

Follow-up questions were asked for purposes of clarification and for securing additional data. The responses to each question are presented below (see Appendix G for a summary of each interview).

I. Planning Phase

A. If a community and current facility/program analysis was made during the planning process, what were the major components included in the analysis?

All thirteen districts had their pre-construction facilities evaluated by the Supervisor of the Ohio School Building Assistance Program.

Ten districts developed some method of collecting community input.

Three districts had independent studies made to determine the cost of renovation prior to making application to the school building assistance program.

Only one district completed a curriculum analysis during the planning process.

B. Which of the following phrases best describe how your district's overall planning was accomplished?

1. Board/superintendent driven
2. Outside paid consultant
3. Ad Hoc Committee appointed by the board.
4. Strategic planning process
5. Other
6. A combination of 1-5.

All thirteen districts involved their staff. Ten districts had a citizen's committee involved with the passage of the bond issue. Only seven districts used these committees after the bond issue was passed.

Ten districts had outside paid assistance during the pre-design planning. Usually, this help was given by the district's architect.

Three districts paid for feasibility studies.

Two districts utilized the potential assistance from the State Department of Educational personnel.

One district paid for university faculty to study its facility and curricular needs.

Generally, after the bond issues were passed, the planning process is best described as board/superintendent driven with assistance from the architect until the district began to work on the educational specifications.

II. Design Phase

A. Did the district use a process for interviewing and selecting an architect? If the answer is yes, please describe the process for the selection of the architect.

In seven districts, visitations were made by the board and administration after the screening and interviewing process.

One district selected the architect without going through a selection process, because the architect had just finished another project in an adjacent district.

In one district, the board and superintendent made the selection after screening and interviewing without making any visitations.

In another district, the screening, interviewing and visitations were made by only the administration.

One district's board and administration made visitations prior to the interview process.

One district involved their Ad Hoc Committee along

with the board and administration on visitations made prior to the interviews.

One district had the architect on retainer years prior to the project.

B. If an educational specification writer was employed, what criteria were used and who was involved in selecting this project consultant?

Only one district employed an external educational specification writer. He was selected because of his experience and grasp of future curricular and technological needs of schools. The board and superintendent made the selection.

C. Which individuals/resources did the district involve in assisting the educational specifications writer in developing the educational specifications?

All thirteen districts involved their staff, administrators, and architect.

Four districts requested assistance from various state department sources.

Four districts used parents and community members.

Three districts used material published by the Council of Educational Facilities Planners.

Two districts involved a board member.

Two districts took their staff members on school visitations.

One district involved a university.

One district used extensive material printed by the North Central Association.

One district involved a local research and development team to assist in the development of their science area specifications.

One district requested assistance from their county office.

No district requested assistance from students.

Nine districts did involve someone or some source beyond staff and administration. Only two districts involved more than two individuals/ resources (one used three; and one used five).

D. If a new site was used to construct the facility, what criteria were reviewed during the process of selecting the site?

Eight districts chose new sites. The common criteria were access to highways, utilities, population center of the district, and available acreage for playground, athletic needs, and future expansion.

Two districts selected sites that needed extensive site preparation prior to construction. In both cases, the advantages of the site out weighed the cost of preparing the site.

E. Did the district explore construction options?

Five superintendents report that their districts considered various construction options.

One district incorporated a prefabricated steel component into the overall design of a brick and mortar facility.

F. Who did the board of education involve to assist in reviewing the architect's schematic design material?

Five boards of education only involved the administration.

Three boards of education involved the administration.

Two boards of education involved their administration, staff, community committees, and out of the district assistance (educational specification writer or a university study as a reference).

Two boards of education involved their administration, staff, and community committee.

One board of education involved its administration and construction manager.

G. Who did the board of education involve to assist in reviewing the architect's design development material?

Five boards of education involved their administration.

Four boards of education involved their administration, staff, a community committee, and/or out of district assistance.

Three boards of education did not review the architect's design development material (Note: Two of these three districts were unhappy with their projects and considered legal action against their architect).

One board of education involved their administration and staff.

III. Contracting Phase

A. Did anyone in addition to the architect assist the district in determining the "lowest and best" bids and in evaluating the materials to be supplied under the "or equal" clause of the specifications? If the answer is yes, who assisted the district?

Nine districts relied totally on the architect to determine the "lowest and best" bids and write the construction contracts.

Two districts had their attorneys review the contract language after the architect made his recommendations.

One district's construction manager assisted the architect in determining the "lowest and best" bids.

One district had a board member, who had retired after a career in construction, assist the architect.

IV. Construction Phase

A. If the district held a ground breaking ceremony, who was invited to participate?

All thirteen districts invited state and local officials, along with representatives from the Ohio Department of Education to participate with the local board in the ground breaking ceremony.

B. Were different types of construction administration reviewed prior to selecting the type of instruction administration used? What type did your district select and were you satisfied with the type of construction management used?

Six districts considered different types of construction administration. The types considered were construction management, clerk of the works and extended architect's field representative.

Nine districts chose the architect's field representative method. Three of these districts negotiated more inspections--typically three 1/2 days per week.

One district used construction management.

Four districts who used the architect or architect's field method recommended that districts entering a building program in the future use a method that involves someone on site more often than 1/2 day per week.

Seven districts were pleased with the construction management method chosen by their district.

One district using construction management;

Three districts who negotiated additional weekly inspections with the architect's representative method;

One district having the inspections by the architect;

Two districts using the regular architect's field representative.

C. Who was responsible for inspecting the construction for compliance with the design and specifications?

All thirteen districts were inspected for design and specification compliance by an employee of the district's architectural firm.

Six districts involved both the architect and field representative.

Three districts were inspected by only the architect.

One district was inspected by the architect, his field representative and occasionally by engineers employed by the architect.

One district's inspections were made only by the field representative.

One district's inspections were made by the construction manager who was also an employee of the district's architectural firm.

D. Who represented the district with the following?

1. Job meetings.

All thirteen districts were represented by either the architect or the architect's field representative and the district's superintendent.

Four districts involved a principal.

Four districts involved a board member.

One district involved its construction manager.

One district involved its maintenance supervisor.

2. Review of change order requests.

All thirteen district's architects were involved with reviewing the change orders.

Ten district superintendent's assisted in reviewing the change orders.

Two districts involved their treasurer.

One district involved their construction manager.

3. Review of payment requests.

   All thirteen districts' architects were involved with the review of all payment requests.

   Six districts involved their superintendents.

   Six districts involved their treasurer.

   One district involved a board member.

   One district involved its construction manager.

4. Activation of HVAC, electrical, plumbing, etc. systems.

   Only two districts used a combination of the same individuals (principal and custodians).

   Twelve districts used combinations of classified employees (maintenance and custodians).

   Only two districts involved their architects.

   Only two districts involved their superintendents.

   Five districts involved their building principal.

   Two districts involved the appropriate engineer.

   One district involved its construction manager.

5. Creation of the final punch list.

   There were ten different combinations of individuals used.

   Ten superintendents were involved.

   Eight architectural firms' field representatives were involved.

Seven architects were involved.

Four districts involved maintenance and/or custodial staff.

Three principals were involved.

Two districts involved their staff.

One construction manager was involved.

One district never completed the punch list because problems with the architect occurred prior to the project being occupied.

E. If the district held a dedication ceremony,

who was involved?

Eleven districts involved state and local elected officials, along with representatives from the Ohio Department of Education. They participated with the local board in the dedication ceremony.

Two districts did not have a dedication ceremony because their projects were short of funds and were not completed prior to occupancy.

V. Equipping Phase

A. At what point in the project was the following

equipment selected?

1. Fixed--lighting, heating, plumbing, etc.

All thirteen districts selected the mechanical fixed equipment during the design development phase.

2. Other fixed equipment that is an

integral part of the superstructure--

kitchen, industrial arts, science labs,

etc.

Nine districts selected this equipment during the design development phase.

Two districts selected this equipment after the construction had started.

Two districts selected part of the equipment during the design development phase and the rest after the construction was under way.

3. Built-in equipment not requiring any utilities connection--bookcases, cabinets, etc.

Eight districts selected this equipment during the design development phase.

Four districts selected this equipment after the construction had begun.

One district selected part of this equipment during the design development phase and the rest after the construction had begun.

4. Stationary equipment--auditorium seats, bleachers, etc.

Nine districts selected this equipment during the design development phase.

Three districts selected this equipment after the construction had started.

One district selected part of this equipment during the design development phase and the remainder after the construction had started.

5. Movable/loose equipment

All thirteen districts selected this equipment after the construction was under way.

VI. Occupancy Phase

A. If there was an occupancy/orientation plan developed for moving into the new facilities, who was involved with developing the plan?

All thirteen districts reported that occupancy/orientation plans worked very well.

Eleven districts reported their plan was cooperatively developed by the administration

and staff (both classified and certificated).

In two districts, only the administration developed the plan.

One district involved students and parents.

One district involved the board of education.

VII. Post-Construction Evaluation Phase

A. If there was a post-construction evaluation of the project, who was involved?

Six districts conducted post-construction evaluations involving their architects and superintendents/administration. One district also involved its board of education and its building Ad Hoc Committee.

Seven districts did not hold a post-construction evaluation.

VIII. Preventative Maintenance Phase

A. If a preventative maintenance program was developed by the district, describe its type.

Eight districts have or are developing a basic check list or flip card paper and pencil system that records when service or maintenance has been performed on major mechanical equipment.

One district has involved local industry maintenance personnel that resulted in a computer generated preventative maintenance program being initiated that schedules preventative maintenance activities and records time and cost. Eventually, there data will be used to assist the district in projecting the maintenance and equipment replacement budgets.

Four districts have not started development of a preventative maintenance program.

## Analysis of Data

The study attempts to determine congruence with the School Facility Construction model that was developed after completion of a study of the school facility construction

literature. The interview guide consisted of nineteen questions. Following is an analysis of each question.

I. Planning

A. If a community and current facility/program analysis was made during the planning process, what were the major components included in the analysis?

The only common component was a facility evaluation performed by the supervisor of the Ohio School Building Assistance Program.

Twelve districts were found not to be congruent with the model.

It is probably unrealistic to expect the districts participating in Ohio's School Building Assistance Program to be in congruence with this question, because these districts are generally low wealth, low income districts with stable or slightly declining school populations. The thrust of their planning was centered around getting the bond issues passed so they would be eligible to participate in the School Building Assistance Program. If the issue passed, the district proceeded immediately to the design phase.

B. Which of the following phrases best describe how your district's overall planning was accomplished.

1. Board/superintendent driven.
2. Outside paid consultant.
3. Ad Hoc Committee appointed by the board.
4. Strategic planning process.

5. Other

6. A combination of 1-5.

Number 6 best describes the planning process of all the districts. Most districts used assistance from their architect as the board/superintendent drove the process. Generally, after the bond issues were passed, the planning was accomplished by the board/superintendent and the architect.

The thrust of the literature behind the model involves community analysis, input, and participation at a level only accomplished by one district. Therefore, twelve districts were found not to be congruent.

II. Design Phase

A. Did the district use a process for interviewing and selecting an architect? If the answer is yes, please describe the process.

Selection of the architect may have been the single most important factor in determining the quality of the completed facility.

Twelve districts selected architects just prior or just after the passage of their bond issues.

Eight districts were found to be congruent with the model, because they screened applicants and visited sites prior to or after an interview process. One district involved a community ad hoc committee in the selection process.

Four districts were found not to be congruent with the model.

Two of the three districts who developed major problems with their architect were found not to be congruent with the model. The third district went through the process outlined by the model, but was influenced in making its selection by a key community member who had worked with the architect in non-educational projects.

B. If an educational specification writer was employed, what criteria were used and who was involved in selecting this project consultant?

One of the important goals of a building program is to design a school environment that has the flexibility to remain educationally functional well into the future. A good educational specification writer is able to enhance and enlarge the thinking of the district's planning team in hopes that educational flexibility will be designed into the facility.

The question is asked, can a district foresee the educational needs of its students and community solely by allowing its architect, administrators, and staff to develop to the educational specifications?

Twelve out of the thirteen districts were found not to be congruent with the model.

C. Which individuals/resources did the district involve in assisting the educational specification writer in developing the educational specifications?

There were many inexpensive individuals/resources available to the thirteen districts participating in the school building assistance projects studied.

Generally, the use of individuals/resources to assist the educational specification writer was found not to be congruent with the model.

D. If a new site were used to construct the facility, what criteria were reviewed during the process of selecting the site?

The eight districts that selected new sites were found to be in congruence with the model.

E. Did the district explore construction options?

Much of the literature that was printed twenty years ago placed HVAC, security systems, fire warning systems, dust collection systems, drop ceilings and lighting systems, prefabricated steel joists, roofing systems, etc., in the category of construction options. These systems have become integrated into current construction to the point that these superintendents did not

consider them as construction options.

The superintendents interpreted construction options as prefabricated structures, precast concrete and modular buildings. These types of structures were stereotyped as cheap and inferior buildings. The state building assistance program provided the financial assistance that permitted a "quality school" to be designed and built.

Eight districts did not even consider construction options. At least three of those eight districts had cost over runs that forced the district to re-enter the current round of building assistance projects to receive additional funds.

One district incorporated a construction option as a component of its design.

Eight of the thirteen districts were found not to be congruent with the model, because they did not evaluate or consider construction options.

F. Who did the board of education involve to assist in reviewing the architect's schematic design material?

Eight districts were found not to be congruent with the model, because only the administration and/or staff helped the board review the schematic design material.

Five districts were found to be congruent with the model.

G. Who did the board of education involve to assist in reviewing the architect's design development material?

Nine districts were found not to be congruent with the model.

Four districts were found to be congruent with the model.

III. Contracting Phase

A. Did anyone in addition to the architect assist the district in determining the "lowest and best" bids and in evaluating the materials to be supplied

under the "or equal" clause of the specifications?

All districts were found to be congruent with the model.

IV. Construction Phase

A. If the district held a ground breaking ceremony, who was invited to participate?

All districts were found to be congruent with the model.

B. Were different types of construction administration reviewed prior to selecting the type of construction administration used? What type did your district select and were you satisfied with the type of construction management used?

In practice, the best inspection is continuous inspection. Four districts were found to be in congruence with the model. Nine districts were found not to be in congruence with the model.

C. Who was responsible for inspecting the construction for compliance with the design and specifications?

All thirteen districts were found to be in congruence with the model.

D. Who represented the district with the following:

1. Job meetings

All districts were found to be in congruence.

2. Review of change order requests.

All districts were found to be in congruence.

3. Review of payment requests.

All districts were found to be in congruence.

4. Activation of HVAC, electrical, plumbing,

etc. systems.

All districts were found to be in congruence.

5. Creation of the final punch list.

Twelve districts were found to be in congruence.

E. If the district held a dedication ceremony, who was involved?

Eleven districts were found to be in congruence with the model.

V. Equipping Phase

A. At what point in the project was the following equipment selected?

1. Fixed--lighting, heating, plumbing, etc.

All districts were found to be in congruence with the model.

2. Fixed other than equipment that is an integral part of the superstructure--kitchen, industrial arts, science lab, etc.

The model makes no distinction when this equipment is bid. Therefore, all districts were found to be in congruence.

3. Built in equipment not requiring any utility connections--bookcases, cabinets, etc.

The model makes no distinction when this equipment is bid. Therefore, all districts were found to be in congruence.

4. Stationary equipment--auditorium seating, bleachers, etc.

The model makes no distinction when this equipment is bid. Therefore, all districts were found to be in congruence.

5. Movable/loose equipment.

All districts were found to be in congruence with the model.

None of the thirteen districts was in a panic situation that required construction to be fast tracked. Two of the districts who selected most of their non-structural/mechanical equipment after construction had started ran into cost overruns that caused their equipment budgets to shrink. Many costly change orders resulted for those districts who specified the non-mechanical fixed, built-in equipment, and stationary equipment after construction had started to adjust locations of electrical outlets, heat diffussors, light fixtures, etc.

VI. Occupancy Phase

A. If there was an occupancy/orientation plan developed for moving into the new facilities, who was involved with developing the plan?

In general, all thirteen districts were found to be in congruence with the model.

VII. Post-Construction Evaluation Phase

A. If there was a post-construction evaluation of the project, who was involved?

Only six of the thirteen districts were found to be in congruence with the model.

VIII. Preventative Maintenance Phase

D. If a preventative maintenance program was developed by the district, describe its type.

All thirteen districts were found not to be in congruence with the model. One district has started working toward a computer driven program that, when fully implemented, will place this district in congruence with the model.

## Summary

Based upon the findings from the analysis of the data collected from the thirteen school districts participating in the School Building Assistance Program from 1983 to 1990, several components were found to be in congruence while several components were found to be out of congruence. Additionally, several components reveal mixed results.

Districts were found to be in congruence with the model in the Contracting Phase, most areas of the Construction Phase and Equipping Phase. Districts were found to be out of congruence with the Planning Phase, several components of the Design Phase, Post-Construction Evaluation Phase and the Preventative Maintenance Phase.

Table 5 summarizes the congruence or noncongruence with the model of the thirteen districts participating in the Ohio Building Assistance Program from 1983 to 1990.

TABLE 5

CONGRUENCE OR NON-CONGRUENCE WITH MODEL

| Components | In Congruence | Out of Congruence |
|---|---|---|
| I. Planning Phase | | |
| A. Community Analysis | 1 | 12 |
| B. District's Planning Process | 1 | 12 |

| | | | | |
|---|---|---|---|---|
| II. | Design Phase | | | |
| | A. | Architect Selection Process | 8 | 5 |
| | B. | Specification Writer | 1 | 12 |
| | C. | Use of Out-of-District Resources | 0 | 13 |
| | D. | Site Selection Process | 8 | 0 |
| | E. | Explored Construction Options | 5 | 8 |
| | F. | Assistance During Schematic Design | 5 | 8 |
| | G. | Assistance during Design Development | 4 | 9 |
| III. | Contracting Phase | | 13 | 0 |
| IV. | Construction Phase | | | |
| | A. | Ground Breaking Ceremony | 13 | 0 |
| | B. | Review of Construction Administration Options | 4 | 9 |
| | C. | Inspection Responsibilities | 13 | 0 |
| | D. | Represented District | | |
| | | 1. Job Meeting | 13 | 0 |
| | | 2. Change Order Review | 13 | 0 |
| | | 3. Payment Request Review | 13 | 0 |
| | | 4. Activation | 13 | 0 |
| | | 5. Punch List | 12 | 1 |
| | E. | Dedication Ceremony | 11 | 2 |
| V. | Equipping Phase | | | |
| | A. | When Specified | | |
| | | 1. Fixed | 13 | 0 |

| | | | |
|---|---|---|---|
| | 2. Other Fixed | 13 | 0 |
| | 3. Built-in | 13 | 0 |
| | 4. Stationary | 13 | 0 |
| | 5. Movable /loose | 13 | 0 |
| VI. | Occupancy Phase | 13 | 0 |
| VII. | Post-Construction Evaluation Phase | 6 | 7 |
| VIII. | Preventative Maintenance Phase | 0 | 13 |

Source: Interview schedule, 1992

# CHAPTER VI

## SUMMARY AND CONCLUSIONS

The need for new and modern educational facilities across the United States is significant. These needs range from unsafe facilities, to facilities with obsolete mechanical and electrical systems, to facilities that cannot accommodate acceptable educational programs and philosophy.

This study included the identification of the components of a school facility construction program resulting in the development of a School Facility Construction Model. The model breaks the process into planning, designing, contracting, construction, equipping the facilities, occupancy, post-construction evaluation, and preventative maintenance components. Focusing upon the thirteen districts that participated in Ohio's School Building Assistance Program from 1983 through 1990, the study attempts to determine congruence with the School Facility Construction Model.

A nineteen question interview schedule was developed. A copy was mailed to each participating district's superintendent prior to the actual interview.

### Summary of Findings

The School Facility Construction Model recommends that the planning process include information and input from many sources. These sources range from local, staff, and community input to state, university, and national education

experts. The planning process should include, in part, a community analysis, a survey of what the community expects of its school system, analysis of societal and educational trends and evaluation of the current facility and current facility needs. The schools in this study were generally planned without input from the community, university, state department, or national educational authorities. The planning process was out-of-congruence with the model in twelve districts.

The questionnaire investigated seven specific areas of the design phase. These specific areas are: (1) selecting the architect, (2) selecting the educational specification writer, (3) developing educational specifications, (4) selecting and securing the site, (5) considering construction options, (6) developing a systematic design, and (7) completing the design development phase.

The selection of the architect is the single most important decision a board of education makes during a school facility construction project. Four districts' architect selection process was out-of-congruence with the model. Two of these four districts were in a group of three districts that developed major problems with their architect prior to the completion of the project.

Basically, the educational knowledge and insight of the district's architect was of paramount importance to the success of the project. Only one district used a professional educational specification writer to assist in

the development of the district's educational specifications. Another district involved a university to analyze its curricular needs. The majority of the districts did not use any out-of-district assistance to help develop the educational specifications. Generally, the development of the educational specifications were out-of-congruence with the model, especially with assistance in developing the educational programs (curriculum plan, instructional methods, support plans, etc.).

The eight districts that selected new sites were in congruence with the model.

While developing the schematic design of the facilities, the model is based upon the assumption that involvement of the maximum number of people in the decision making process will allow the district to get more for its money and will result in a better product. Eight districts were out-of-congruence because only the administration and/or staff helped the board review the schematic design material.

The administrative team, staff, community committee(s), and educational specification writer need to review every segment of the architect's progress as the final design is being developed. Nine districts were out-of-congruence with the model during the design development phase.

The general process used in reviewing the bids and entering into contracts was in congruence with the model.

The ground breaking ceremonies were all well planned. All thirteen districts were in congruence with the model.

Seven districts were pleased with the method of construction administration chosen and the amount of time allocated to inspections during the construction phase. Three districts had negotiated for additional inspection time by the architect's field representative and one district used construction management. Four other superintendents indicated that if they went through another building program, they would encourage their boards to contract for more inspection time or use construction management. Only four districts were in congruence with the model.

All thirteen districts were in congruence with the model in the areas of job meeting representation, change order review, review of payment request, activation of the facilities, and the development of the punch list.

The eleven districts that were able to bring their projects to completion or near completion held dedication ceremonies that were in congruence with the model.

Two of the districts that specified most of the non-fixed equipment during the construction phase ran into cost overruns that prohibited them from purchasing the necessary built-in, stationary, and loose equipment needed to provide an adequate educational program. All districts were in congruence with acceptable methods of specifying equipment for school facilities.

All thirteen districts developed in-house occupancy plans that were in congruence with the model.

Only six districts held post-construction evaluations of

their facilities. Seven districts were out-of-congruence with the model.

Currently, all thirteen districts are out-of-congruence with the model in respect to acceptable preventative maintenance programs. One district has started toward a computer driven program that, when fully implemented, will place this district in congruence with the model.

## Conclusions

It was concluded that community involvement and professional assistance during the planning phase was seriously lacking by the building assistance districts studied. This lack of participation in the planning process may not have permitted the maximization of state funds.

It was concluded that the lack of comprehensive preventative maintenance programs by the building assistance districts studied will shorten the life expectancy of equipment and will increase future maintenance expenditures.

It was concluded that the necessary funds to assure long-term maintenance and upkeep of the new facilities were not available in most of the building assistance districts.

It was concluded that the following School Facility Construction Model components were performed adequately: Site selection; ground breaking ceremony; assignment of inspection and job meeting responsibilities; assignment of responsibilities for reviewing change orders, payment requests, activation activities, and the development of the final punch list; dedication ceremony; equipping the

facilities; and developing an occupancy plan.

Superintendents' Comments

The superintendents were pleased to share the experiences that dominated their lives for at least three years. They were proud of their new facilities; they were grateful for the opportunity to have participated in the Ohio School Building Assistance Program, both professionally and for their respective communities.

What follows is a collection of comments made during the interviews by superintendents:

1. The Ohio Department of Education should consider implementing a mentorship program for inexperienced superintendents who are about to lead a district into a building program. These mentors could be paid a stipend from the building program funds.
2. The Ohio Department of Education should establish a central clearinghouse of construction specifications and documents that could be used to compare and enhance the construction specifications and documents that are being developed for future projects.
3. A seminar sponsored by a university or by the Ohio Department of Education would have been helpful to expose staffs to new educational trends in construction, design, and educational programming.
4. The Ohio Department of Education should conduct project close out conferences so that the

experiences are recorded while they are still fresh in the minds of the superintendents.

5. A peer review of the facilities by construction experienced superintendents should occur after a project is completed. The Ohio Department of Education could compile these reviews as a means of evaluating the entire School Building Assistance Program.
6. The Ohio Department of Education should review and update the school building assistance procedures and forms.
7. The Ohio Department of Education should study and prepare guidelines to assist districts organize and retrieve the paper documentation during the project.
8. The Ohio Department of Education should require a seminar for key district personnel commencing a school assistance project. The seminar should include a panel of superintendents who have successfully completed a school building assistance program. The state could charge this expense back through each district's building fund.
9. The Ohio School Building Assistance Program should encourage or require districts to employ additional help for the superintendent and treasurer during the construction phase.
10. Districts must insist upon the very best hardware

available.

11. Restroom design and equipment needs to be improved to withstand student abuse, especially toilet dividers.

12. Roofs need greater fall than 1/4" per foot.

13. Outside assistance could have prevented many of the mistakes one district made during the planning and design phase.

Recommendations To Improve Construction Under School Building Assistance Program

1. Lack of financial appropriations for maintenance after the construction project is completed is a major problem. A change in Ohio Revised Code Section 3318 (School Building Assistance Program) is recommended. For each project, the first two mills that is reduced by the County Budget Commission from the voted millage for bond retirement and payment of the interest on the remaining unretired bonds shall be rolled over into a permanent improvement fund earmarked for maintenance of the facilities. Once established, these two mills would be collected until all the bonds are retired (twenty-three years after the bonds were sold).

Millage should be sufficiently reduced in all districts to fully fund this proposed permanent improvement concept, depending upon the growth of the district, sometime during the first seven years

of the bond retirement period.

This recommendation does not address the wealth inequity component. For example, two mills generate $30,000 or $28.50 per student per year in one of the districts, while two mills generate $120,000 or $102 per student per year in another district.

This recommendation addresses the need for the State of Ohio, which provided most of the funds, to protect and prolong the usable life of these school facilities without having to expend additional state money.

2. The Ohio School Building Assistance Program procedures should be modified to mandate that a district allocate one percent of the combined state assistance and local building funds to provide additional in-house assistance during the design through construction phase. These funds could be spent to employ an educational specification writer separate from the architect, additional weekly inspections by the architect's field representative or a clerk-of-the works or a construction manager, additional secretarial/bookkeeping assistance for the district office. The district needs the flexibility to allocate this fund in a combination of services chosen locally.

3. The Ohio School Building Assistance Program

procedures need to mandate more curricular, technology and student needs study and input from external experts. Facilities that will provide an educational environment for thousands of students for the next fifty to seventy-five years cannot be effectively planned locally or merely with the assistance of architects. These needs can be provided with an allocation from the project budget. The elementary and secondary divisions of the State Department of Education should review the educational specifications.

4. The district's architectural firm should be required to provide a Preventative Maintenance Program. This program should include the hardware, software, and the initial loading of the manufacturer's maintenance recommendations found in the owner's equipment manuals.
5. The Ohio School Building Assistance Program should require a post-construction evaluation of the facilities one year after occupancy has occurred. From this evaluation, the building assistance division can build a file on successful and unsuccessful concepts and products. Future assistance districts can be provided this information while they are in the planning and designing phases.
6. The Ohio School Building Assistance Program should

develop a series of required seminars that will provide guidance to districts beginning a building assistance program. Providers of these seminars could include university personnel, the Council of Educational Facility Planners, consultants, a panel of superintendents who have successfully completed projects, and state department staff. Content could range from future educational trends to how to organize the paperwork that a construction project generates. These seminars would also provide assistance to those districts constructing or remodeling schools outside of the Ohio School Building Assistance Program.

7. The Ohio Building Assistance Program requires that a community involvement plan be submitted to the Building Assistance Division by each participating district. This plan should be reviewed, modified if necessary, and approved early in the project's planning phase.

8. Unless time is a greater factor than budgetary considerations, the fixed, stationary, built-in, and possibly the loose equipment should be specified during the design development phase and bid at the same time the construction components are being bid. This concept allows a district to know up front if the project is within budget plus it eliminates any change orders resulting

from equipment not matching the design.

9. The state building assistance program should explore the development of a mentor program using superintendents who have experienced major school construction programs being matched up with superintendents who are going into a building program for the first time.

Recommendation For Further Study

Based on the findings and conclusions of the study, the following recommendations for further study are made:

1. Replication of this study should be undertaken using the current round of schools (beginning in 1990) that are receiving School Building Assistance Funds in Ohio. Results could then be compared providing greater insights into how Ohio can more effectively and efficiently use future state building assistance funds.
2. Further refinement of the survey instrument utilized in this study should be undertaken in order to concentrate on components of a school facility construction program that were found to be out-of-congruence with the model.
3. A follow-up study should be made involving these thirteen districts near the year 2000 to determine if the components that were out-of-congruence with

the model have seriously hampered the educational programs housed within these new facilities.

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# APPENDIX A

# INTERVIEW SCHEDULE

## INTERVIEW SCHEDULE

Opening Statement: I am researching school districts that participated in Ohio's School Building Assistance Program from 1983-1990, as a part of the research for my dissertation study.

I have developed a school facility construction model that includes components in planning, designing, contracting, construction, equipping the facilities, occupancy, post-construction evaluation, and the development of a preventative maintenance program.

By interviewing superintendents of each district that participated in Ohio's School Building Assistance Program from 1983-1990, I will be able to establish the degree of congruence with my model.

I would like to start by asking you briefly to give me some general information about your district.

General Information

A. Name of district

B. ADM prior to project

C. ADM currently

D. Number of teachers prior to project.

E. Number of teachers currently

F. Number of buildings in use prior to your building program.

G. Number of buildings in use after your building program.

H. Approximate assessed valuation at time project began.

I. Approximate assessed valuation at time of interview.

J. General socio-economical description of the district.

K. Structure of central office prior, during construction, and currently.

L. Number of administrators in district prior and currently.

M. Number of secretaries in district office prior, during, and currently.

N. Size of treasurer's staff prior, during, and currently.

O. Other administrators or school employees closely involved with the day-to-day progress of the project.

I. Planning Process

A. If a community and current facility/program analysis was made during the planning process, what were the major components included in the analysis?

B. Which of the following phrases best describe how your district's overall planning was accomplished?

1. Board/superintendent driven

2. Outside paid consultant

3. Ad Hoc Committee appointed by the board.

4. Strategic planning process

5. Other

6. A combination of 1-5. Please identify which ones were used during the planning.

II. Design Phase

A. Did the district use a process for interviewing and selecting an architect? If the answer is yes, please describe the process for the selection of the architect.

B. If an educational specficication writer was employed, what were the criteria used and who was involved in selecting this project consultant?

C. Which individuals/resources did the district involve in assisting the educational specifications writer in developing the educational specifications?

D. If a new site was used to construct the facility, what criteria were reviewed during

the process of selecting the site?

E. Did the district explore construction options?

F. Who did the board of education involve to assist in reviewing the architect's schematic design material?

G. Who did the board of education involve to assist in reviewing the architect's design development material?

III. Contracting Phase

A. Did anyone in addition to the architect assist the district in determining the "lowest and best" bids and in evaluating the materials to be supplied under the "or equal" clause of the specifications? If the answer is yes, who assisted the district?

IV. Contracting Phase

A. If the district held a ground breaking ceremony, who was invited to participate?

B. Were different types of construction administration reviewed prior to selecting the type of construction administration used? What type did your district select and were you satisfied with the type of construction management used?

C. Who was responsible for inspecting the construction for compliance with the design and specifications?

D. Who represented the district with the following:

1. Job meetings.

2. Review of change order requests.

3. Review of payment requests.

4. Activation of HVAC, electrical, plumbing, etc. systems.

5. Creation of the final punch list.

E. If a district held a dedication ceremony, who was involved?

V. Equipping Phase

A. At what point in the project was the following equipment selected?

1. Fixed--lighting, heating, plumbing, etc.

2. Other fixed equipment that is not an integral part of the superstructure--kitchen, industrial arts, science labs, etc.

3. Built-in equipment not requiring any utility connections--bookcases, cabinets, etc.

4. Stationary equipment--auditorium seats, bleachers, etc.

5. Movable/lose equipment

VI. Occupancy Phase

A. If there was an occupancy/orientation plan developed for moving into the new facillities, who was involved with developing the plan?

VII. Post-Construction Evaluation Phase

A. If there was a post-construction evaluation of the project, who was involved?

VIII. Preventative Maintenance Phase

A. If a preventative maintenance program was developed by the district, describe its type.

# APPENDIX B

## PANEL OF EXPERTS

## PANEL OF EXPERTS

List of individuals who reviewed the questions prior to being used during the interviews.

David Long, Supervisor
School Building Assistance Program (1957-1989)
Currently serving as a consultant for
FMS Architects of Columbus, Ohio

Donald Halsey, Supervisor
School Building Assistance Program (1989-90)
Currently employed as Building Supervisor
for Columbus City Schools, Columbus, Ohio

Robert Franklin, Supervisor
School Building Assistance Program (1990- )
Ohio State Department of Education
Columbus, Ohio

# APPENDIX C

## LIST OF SCHOOL BUILDING ASSISTANCE DISTRICTS AND SUPERINTENDENTS INTERVIEWED

1. Bloom-Vernon Local
   County: Scioto
   Superintendent: Charles Lykens

2. Caldwell Exempted Village
   County: Noble
   Superintendent: Dennis Shelton

3. Chesapeake Union Exempted Village
   County: Lawrence
   Superintendent: Dan Russell

4. Crooksville Exempted Village
   County: Perry
   Superintendent: Larry Henry

5. East Guernsey Local
   County: Guernsey
   Superintendent: William Reece

6. Federal Hocking Local
   County: Athens
   Superintendent: Timothy Lairson

7. Georgetown Exempted Village
   County: Brown
   Superintendent: Robert Taylor

8. Huntington Local
   County: Ross
   Superintendent: Martin McGuire

9. Liberty-Union Thurston Local
   County: Fairfield
   Superintendent: John Ruff

10. Rolling Hills Local
    County: Guernsey
    Superintendent: Raymond Cook

11. Trimble Local
    County: Athens
    Superintendent: Judith Campbell

12. Tri-County North Local
    County: Preble
    Superintendent: Phil Dubbs

13. West Liberty-Salem Local
    County: Champaign
    Superintendent: Sherry Meadows

Source: OHIO SCHOOL BUILDING ASSISTANCE DIVISION

# APPENDIX D

## LETTER SENT TO PANEL OF EXPERTS

Tri-County North District Office
P.O. Box 30
108 N. Main
Lockington, Ohio 45332
513/962-2571 • 962-2572 • 833-2714

Philip E. Dubois, Superintendent

January 6, 1992

Mr. Don Halsey
Facility Management
270 East State Street
Columbus, OH 43215

Dear Mr. Halsey:

I appreciate you taking time to review my proposed interview schedule. Your input will be important prior to preparation of the final draft.

From the literature review, a school facility construction project can be divided into the following eight components:

1. Planning
2. Designing
3. Contracting
4. Construction
5. Equipping the facility
6. Occupancy
7. Post-construction evaluation
8. Preventative maintenance/maintenance program

The experiences of many superintendents, facility planners, and architects of successful school construction projects have been reduced to a "School Facilities Construction Model." The interview schedule is designed to assist me in determining if there was congruence to the model by the thirteen (13) districts that participated in Ohio's School Building Assistance Program from 1983 to 1990.

The data collected from these thirteen interviews will be used to determine my findings, conclusions and recommendations which, hopefully, will be of value to future superintendents prior to beginning a school facilities construction project.

Enclosed are Figure 1, Figure 2, and a narrative guideline to figure 2. The questions on Appendix A (Interview Schedule) are derived from this model. To determine congruence to the model will require me to compare each superintendent's response with the recommendation in the literature.

I will be calling you within the week. We may be able to review my interview schedule on the telephone. If you have major recommendations, I will be happy to meet with you in the near future.

Sincerely,

Phil Dubbs
Superintendent

PD/nt

APPENDIX E

LETTER CONFIRMING
INTERVIEW APPOINTMENT

Fairfield County North District Office
P.O. Box 40
108 N. Columbus St.
Lancaster, Ohio 43130
513/962-2671 • 962-2672 • 833-2774

Philip E. Dubbs, Superintendent

January 21, 1992

Mr. Timothy Lairson, Superintendent
Federal Hocking Local School District
P. O. Box 117
Stewart, OH 45778

Dear Mr. Lairson:

This letter is confirming our appointment at 1:00 on Thursday, January 30, 1992.

My wife has made arrangements to accompany me on this trip. We are looking forward to meeting with you.

Enclosed is information that can briefly familiarize you with my project. I can be reached at 513/962-2671 (work) or 513/996-5282 (home).

Sincerely,

Phil Dubbs
Superintendent

PD/nt

Enclosure

BEST COPY AVAILABLE

# APPENDIX F

# INTERVIEW SEQUENCE

INTERVIEW SEQUENCE

1. John Ruff - Liberty Union-Thurston Local
   3:00 p.m., January 21, 1992

2. Raymond Cook - Rolling Hills Local
   11:30 a.m., January 29, 1992

3. William Reece - East Guernsey Local
   2:00 p.m., January 29, 1992

4. Dennis Skelton - Caldwell Exempted Village
   4:00 p.m., January 29, 1992

5. Dan Russell - Chesapeake Exempted Village
   9:00 a.m., January 30, 1992

6. Timothy Lairson - Federal Hocking Local
   1:00 p.m., January 30, 1992

7. Sherry Meadows - West Liberty-Salem
   9:00 a.m., February 6, 1992

8. Judith Campbell - Trimble Local
   1:30 p.m., February 6, 1992
   (Note: Mrs. Campbell is currently superintendent of Bethel Local in Miami County)

9. Robert Taylor - Georgetown Exempted Village
   9:00 a.m., February 14, 1992

10. Charles Lykens - Bloom-Vernon Local
    12:30 p.m., February 14, 1992

11. Martin McGuire - Huntington Local
    3:30 p.m., February 14, 1992

12. Larry Henry - Crooksville Exempted Village
    1:00 p.m., February 26, 1992
    (Note: Mr. Henry is currently superintendent of Brookville Local in Montgomery County)

# APPENDIX G

## SUMMARY OF EACH INTERVIEW

## SUMMARY OF INTERVIEW DATA

District 1:

This rural Appalachian bedroom district constructed a new 7-12 grade facility that was connected with and shares several major components of a K-6 facility also built through Ohio School Building Assistance Funds in 1981.

The district has incurred modest growth since the project began. The assessed valuation has increased 15 percent ($17.5 million to $20 million). The ADM has grown from 1,230 to 1,292. The school facilities, along with an extension of the county water system throughout the district, have contributed to this growth.

The unemployment rate in this district is high, with 20 percent of the student body receiving ADC.

The central office, administrative, and treasurer's staff have remained constant since prior to the construction. The superintendent's secretary also doubles as the payroll clerk for the treasurer.

The high school principal was the main source of in-district assistance available to the superintendent during construction.

The planning process actually began in the mid 1970's when a facilities assessment revealed that the cost of renovation exceeded what the district's share would be for new facilities through the State Building Assistance Program.

Teachers and parents served on a district bond levy committee. After passage of the bond issue, the planning

process can be characterized as board/superintendent driven.

The architect's selection process began with the board advertising throughout Ohio. Those firms that showed interest were screened down to four finalists. The selection was made after those four firms were interviewed and visits were made by the superintendent and board to their former and current projects.

The educational specifications were developed by the architect and the superintendent after input was gathered from the staff and administration. No outside individuals or sources assisted the district in its development of the educational specifications.

A new site was not selected, however, if more state assistance money had been available, a different site would have been selected and developed.

Various construction options were explored. The final design mixed a prefabricated steel structure with traditional brick and mortar. The HVAC system was integrated with the existing system that is housed in the K-6 facility.

Most of the schematic and design development decisions were made by the architect, superintendent, and high school principal. The board reviewed and approved the recommendations.

The bidding process was reviewed by the board's attorney. The architect made recommendations for the selection of bids.

State and local elected officials, along with

representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The architect personally inspected the site for a half day each week. The superintendent recommended that districts consider using construction management, because the inspections are continuous. The construction manager would be knowledgeable about construction and would be of great assistance with the paper documentation that needs to occur during a major construction project.

Because the architect personally visited the site, he was responsible for construction compliance, represented the district at job meetings, reviewed change orders, payment requests, and was present at most activation procedures. During the days when the architect was not present, the superintendent, high school principal, the board president, and the head custodian inspected the construction progress.

During activation procedures, the superintendent, high school principal, and head custodian were present. Most activation procedures consisted of show and tell exercises with operational manuals turned over to the district.

The final punch list was developed by the architect and the superintendent.

A dedication ceremony similar to the ground breaking ceremony was held with the same individuals being invited. An open house was held immediately after the dedication ceremony.

All equipment was speced in the design development phase, except the loose equipment and gymnasium bleachers.

The development of the occupancy plan, involving staff, students, and parents, was successful.

There was no post-construction evaluation by the architect or the State Building Assistance Division.

There has been no formal preventative maintenance program developed.

This district is planning to use the same architect in its next small project.

District 2

This central Ohio agricultural community constructed a new high school, then converted the old high school into a middle school. This district continues to maintain three facilities.

The district's ADM has dropped from 1,280 prior to construction to the current ADM of 1,259. Staff numbers have also decreased due to its financial condition. A sizable income tax was passed in 1990 that will help stabilize the financial future of the district.

The assessed valuation has increased by about 10 percent since 1985 ($50 million to $55 million). The new school facility may have played a minor role in the modest growth.

The administrative staff has and continues to consist of a superintendent and three principals. Each administrator has a secretary. The treasurer's staff has consisted of 2.5 persons. The superintendent had no in-house assistance for

monitoring the day-to-day progress of the project.

The superintendent personally evaluated the former facilities against North Central Association Standards. The review was limited to size, personnel, and handicapped accessible requirements. No other planning took place. The planning process can be characterized as superintendent/board driven.

The board interviewed five architectural candidates with a pre-established interview format. Site visitations were made prior to making the final selection by the board and superintendent.

The superintendent wrote the educational specifications with the assistance of the staff and architect using North Central Association accreditation criteria. No outside individuals or resources were used during the planning phase.

A construction manager was employed. The superintendent was very satisfied with the services provided by this individual. He recommends that all future building assistance projects explore using a construction manager. (Note: This construction manager was associated with the architectural firm employed by the district).

The district relied upon the architect and the construction manager to review the schematic and design development material prior to asking the board for approval. The superintendent reviewed the finished design development package with the staff prior to approval. This process appeared to be more of a public relations exercise than an

inspection process.

The district's ground breaking ceremony included participation by local and state elected officials, state department representation, and local board members.

Different types of construction options were explored prior to the selection of an individualized designed building.

The construction manager was responsible for inspecting the construction for compliance with the design and specifications.

During job meetings, the district was represented by the superintendent, construction manager, and a representative from the architect's office. The change orders were reviewed by the construction manager and the architect. The payment requests were reviewed by the construction manager, architect, and the superintendent.

The construction manager and head custodian were present for all activation procedures. The architect was responsible for developing the final punch list.

The dedication ceremony generally involved the same individuals who participated in the ground breaking ceremony.

The fixed and stationary equipment was selected during the design development phase. The built-in equipment and most of the loose equipment was selected by the superintendent during the early construction phase of the project.

The high school principal and superintendent developed

the occupancy plan. The plan was completed successfully.

There was no post-construction evaluation made by the architectural firm or the State Building Assistance Division.

The district has not implemented a planned preventative maintenance program.

District 3

This southeastern Ohio exempted village school district constructed a new high school, moved the middle school to the old high school and donated the old middle school to the city. This district continues to maintain three school facilities.

The economy of the area is depressed, resulting in 26% of the student body eligible for ADC funds. The district is a small (28 square miles) bedroom community for a modest size urban area across the Ohio River. The ADM has continued to slide, with the high school dropping from 575 to 550 since 1988. The assessed valuation has remained about the same.

The administrative staff of the district has remained the same since prior to the construction (superintendent, supervisor of federal programs, and three principals). The treasurer's staff (2) and the number of central office secretaries (1) has remained the same.

The superintendent was assisted in-house by the high school principal and the head maintenance person throughout the project.

The district contracted with a university to perform a curriculum and facility study. This information was the

basis for completing the state building assistance application process. The district appointed a citizen's steering committee that stayed with the project through its completion. The planning process used a combination of sources and input.

The board selected four architectural finalists, who were interviewed using a pre-planned format. The board, superintendent, and high school principal visited buildings that were completed by the top architect prior to a final decision. The superintendent was very satisfied with the architectural firm that developed the project.

The educational specifications were developed by the architect with input from the superintendent, principal, staff, and the curriculum study previously completed by the university team. No additional outside sources were involved during the writing of the educational specifications.

The site was selected years ago because of its access to the highway system, availability of water, sewer, gas, and utility services. The site flows into the former high school (currently middle school) site.

This district did not explore construction options.

The steering committee and staff were involved in the review processes of both the schematic and design development documents.

Two legal questions developed during the bidding process that delayed the start of construction for five (5) weeks. This gave additional time for the steering committee and

staff to review the design development materials.

Only the architect assisted in reviewing the bids and substitution list of the bidders.

State and local elected officials, along with representatives from the Ohio State Department of Education, participated with the local board in the ground breaking ceremonies.

The district interviewed two candidates who would have served as "clerk of the work." However, the board rejected this method and used the standard architectural field representative system. The district negotiated a fee that placed that representative on site a minimum of three (3) days per week.

The architect and field representative were responsible for determining if construction was in compliance with the design and specifications.

The architect's representative and the superintendent represented the district at job meetings. Small change orders of less than $10,000 needed only the superintendent's and architect's approval. The board became involved with change orders in excess of $10,000. The treasurer and architect reviewed the payment requests.

The architect's field representative, head maintenance person, head custodian, and the high school principal were present for all activation procedures.

The architect, superintendent, principal, and appropriate staff worked together to develop the punch list.

For the most part, the dedication ceremony involved the same individuals who participated in the ground breaking ceremony.

The fixed equipment (kitchen, industrial arts, etc.) and the built-in equipment were selected during the design development phase. The stationary and loose equipment were selected after the construction had begun.

The staff and administration developed a successful occupancy plan.

This district did not have a post-construction evaluation of the project.

The district is working on a preventative maintenance plan. This plan will include lubrication and cleaning of the major pieces of HVAC and other major items. It is not a detailed and comprehensive program.

The superintendent was pleased with the service and work performed by the architectural firm. He would not hesitate to use this firm again.

District 4

This rural southeastern Ohio exempted village district constructed a new high school that was completed in 1987. The district's ADM is currently 1,110, up about 20 students since the project began. Since the completion of this new high school, the district has accepted about 35 tuition students. The new high school was built on an adjoining site where the K-8 facility was completed with State School Building Assistance Funds in the late 1970's. The new high

school replaced a high school complex that was partly torn down, partly mothballed, and partly converted into a preschool special education facility and community activity area.

The unemployment rate in the district is very high, with 20 to 25 percent of the students receiving ADC assistance. The major coal mines, logging operations and pottery plants have closed, leaving sources of local employment very limited.

The administrative structure has remained the same since prior to the project, consisting of a superintendent, three principals, a treasurer and an assistant treasurer, and an executive secretary. The high school principal assisted the superintendent with the day-to-day observations.

The planning process began in the 1970's when the former high school lost its North Central Accreditation due to a lack of quality facilities. The board created a citizens committee for the passage of the bond issue. After the passage of the bond issue, the planning process can be characterized as board/superintendent driven with assistance from the district's architect.

The board and superintendent conducted an architect search by screening, interviewing, and visiting schools designed by the three finalist. The superintendent was very satisfied with the architect.

The architect wrote the educational specifications with input from the administration and staff. The architect did

not involve any outside assistance while developing the educational specifications.

The site has good highway access, utilities and available land to develop the athletic/playground area. The district had to construct its own sewage system on the site.

The district did not explore any construction options.

The board, administration and staff reviewed the schematic phases with the architect. Very little community participation took place during this phase. No board, administrative or community participation occurred as the architect developed the design development phase.

Only the architect was involved in determining the "lowest and best" bids.

State and local officials, along with representatives from the State Department of Education, participated with the local board in the ground breaking ceremony.

The standard architectural field representative system of construction management was selected. The architect's field representative was responsible for assuring compliance with the design and specifications. The superintendent and high school principal, along with the field representative, represented the school at the job meeting. The architect, architect's representative, and administration reviewed the change order requests. The treasurer and architect reviewed payment requests.

The architect's field representative, the high school principal and a community member with knowledge of

construction were present when the various mechanical and electrical systems were activated. The punch list was developed by the architect's representative, high school principal, and superintendent.

The dedication ceremony generally involved the same individuals who participated in the ground breaking ceremony.

All of the equipment was selected during the design process, except the loose equipment. The loose equipment was specified, bid, and purchased during the construction phase.

The move into the new facility occurred in November. The staff and administration developed an occupancy plan that worked very well. Students were used to move most of the books and supplies.

No formal post-construction evaluation occurred.

A preventative maintenance program was developed that involved very expensive service contracts. The district is attempting to move away from service contracts by developing their own in-house flip-chart system.

District 5

This west central Ohio district constructed a new K-12 facility and remodeled one of the existing buildings into a district office and central storage. Three former buildings were demolished and turned into parking lots for the new facility. One building was sold at public auction. The ADM has increased from 1,108 prior to the construction to the current 1,177. Four new teaching positions have been added to the faculty, two of which have been for new programs.

The assessed valuation of the district has increased from $45 million to $61.5 million since the bond issue was passed in 1986. This growth has been the result of expansion of local industry, new housing starts and a major new pipeline (assessed at $5.5 million). The new school facility has influenced this growth and expansion. The ADC population in the district has dropped to 8+ percent from approximately 10 percent prior to the start of construction.

The administration structure of the district has remained the same--superintendent, three principals, a treasurer, an assistant to the treasurer, and one district office secretary. The middle school principal was involved throughout the project by attending job meetings and walk throughs.

After a well organized citizens group worked to pass the district's share (bond issue) of the project, the board requested that the State School Building Assistance division supply a list of architectural firms that had successfully completed a state building assistance program during the past five years. This list was screened down to four firms. The board then named an Ad Hoc Building Committee of community individuals, most of whom had some area of construction expertise. The board members, administration, and the Ad Hoc Committee visited a minimum of five facilities of each of the remaining four architects. The four architects were then interviewed in a town-meeting setting. The board's and Ad Hoc Committee's first choice was the same

(Note: Not all members of either group selected the consensus choice).

An experienced out-of-the-district educational specification writer wrote the educational specifications after numerous conferences were held, involving the staff, administration, and the architect. The specification writer was well versed in future educational and technology trends. The architect participated in all of the staff conferences.

The specification writer, superintendent and a board member attended a two-day seminar sponsored by the Counsel of Educational Facilities Planners. Several state department personnel with expertise in the areas of library, vocational agriculture, home economics, food service, and physical education, met with their respective subcommittees.

An Ad Hoc Technology Committee was formed to plan the educational technology for the new facility. A local company assigned its research lab personnel to assist in developing the specifications of the science labs. Several county office personnel worked with various subcommittees.

Three construction sites were reviewed. The staff made a pivotal presentation that helped the board select one site for a K-12 complex. The site selected was owned by the board and had access to the village streets, village water and sewer, and was well-drained. Several physical obstacles had to be overcome, because the site sets on a bed of limestone and dramatically dropped off beyond where the facility now stands.

The district rejected any prefabricated structural components for a traditional brick and mortar building. However, several construction systems, including the HVAC and security systems were incorporated into the design.

The board with the assistance of the administration, staff, the Ad Hoc Building Committee, and the Educational Specification Writer reviewed the schematic and design development materials. One regret was that more time was not allocated to the review of the design development plans and specifications. This lack of time prevented the expertise of the Ad Hoc Committee fron being fully utilized during this stage.

The architect made the recommendations to the board related to the "lowest and best" bids and evaluation of substitutions and alternates.

The district had a well-organized ground breaking ceremony involving representatives from the Ohio Department of Education, legislators, county and local elected officials, current and former board members, representatives of the bond issue campaign, the Ad Hoc Building Committee, staff, parents, students, and county office personnel and board members.

The board did not seriously consider construction management, selecting the Architect Field Representative method. The field representative, the architect, and the architect's engineers, were responsible for assuring that the contractors were in compliance with the design and

specifications.

The field representative, superintendent, and middle school principal represented the district in all job meetings. Occasionally, the architect or one of the engineers participated. Change orders and payment requests were reviewed and approved by the architect and superintendent.

Usually, an engineer and the district's maintenance person was involved in all activation procedures. Where appropriate, other individuals attended the activation procedures.

The field representative and superintendent were responsible for developing the punch list. The board and the Ad Hoc Committee conducted walk through, thus were able to give input to the superintendent.

Participants in the dedication ceremony involved the assistant state superintendent, county superintendent, state senator and representative, school board members, and local and county elected officials. An open house followed the dedication, with local civic groups assisting.

The fixed equipment, gym bleachers, gym backboards, and library equipment were selected during the design development phase. Separate specifications were developed and bids were taken after construction had begun for the vocational agriculture equipment, industrial technology equipment, auditorium seating, science equipment, kitchen equipment, storage and bookcases in the classrooms, home economics

equipment and appliances, technology equipment, and all the loose equipment. Some of this equipment may have been more efficiently planned in the design development phase.

A successful occupancy plan was developed, involving both the certificated and classified staff.

There was a post-construction evaluation involving the architect, administration, board members, and the Ad Hoc Building Committee.

A computerized preventative maintenance program is under way. Several maintenance individuals from local industries assisted in the selection and development of the preventative maintenance program.

District 6

This eastern Ohio exempted village district constructed a new elementary school in 1986 that consolidated two former elementaries, reducing individual buildings in use in the district from four to two. The district also is in the latest round of building assistance programs. This new project will involve finishing the elementary project and building a science wing on the 7-12 building.

This district has incurred modest assessed valuation increase from $61.5 million to $65 million in the past six years. This growth has occurred over and above the loss of personal tangible property value. Most of the mines and logging operations have disappeared. The district does have one major industrial plant that employs over 300 individuals. Many of the residents have to commute out of the district for

their employment. The ADM has remained around the 1,230 figure since the project began. The instructional staff has remained the same.

The administrative staff has remained the same with a superintendent and a director of curriculum (each with a secretary), a treasurer, and an assistant treasurer. The district has added 1/2 additional assistant principal after reorganization.

A board member, who was a retired construction foreman, and the superintendent reviewed the day-to-day progress of the construction.

A community needs assessment was conducted through the local weekly newspaper prior to applying for state assistance. The board appointed a citizens advisory committee. This committee helped pave the way to consolidate the two elementaries into one centrally located building This planning process can be characterized as board/ superintendent driven with assistance from a citizens committee. The main thrust at that time was to sell the need to build a new school and to consolidate the elementaries. A current building assessment did not occur and no out of district schools were visited for ideas.

The district selected the architect who had just completed another school in the county without interviewing any other architects.

The architect developed the educational specifications after interviewing the staff. One board member and the

superintendent provided input.

The final site selection was made after considering several sites. The site selection has excellent access to highways, water, sewage, and utilities. Enough land was purchased that a middle school or high school could be built on the site some day. The site is centrally located in the district and is close to fire, emergency, and police protection.

The district did not explore any construction options.

The board basically rubber stamped the architect's schematic and design development presentations and documents. After the project was occupied, the board gave serious consideration toward filing a law suit against the architectural firm for what the board considered major design and specification flaws.

The architect analyzed the "lowest and best" bids and made his recommendations to the board. A board member, superintendent, and the treasurer assisted the architect.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The district did not consider any construction administration options. They went with the traditional architect/field representative system. The architect and his field representative were responsible for compliance with the design and the specifications.

The superintendent, a board member, and the architect or his field representative represented the district at job meetings. This same group of individuals reviewed the change order requests and payment requests.

The head maintenance person for the district represented the district at all activation procedures.

A final punch list was never completed because of problems that developed between the district and the architect. Major problems still exist with the roof and gymnasium floor.

There was no dedication ceremony, as major portions of the project never were finished because funds were used to correct design errors. This situation will be corrected, because the district was successful in securing additional funds through the round of assistance projects that were approved in 1990 and began in 1991.

The fixed equipment, built-in equipment, and stationary equipment were included in design development specifications. Some of the other fixed equipment was specified, along with the loose equipment after the construction was under way.

The occupancy plan developed by the staff was successful.

There was no post-construction evaluation of the project.

The district has begun working toward a preventative maintenance manual that will give guidance to the custodial staff.

The current superintendent feels that many of the mistakes that were made could have been prevented if the district would have just asked for help from outside sources.

District 7

This large eastern Ohio school district constructed a new high school, converted the old high school into a middle school, and closed two buildings in the process. Four buildings are currently in use. The ADM has dropped from 1,250 when the project started in 1985 to the current level of 1,170. The area is extremely depressed due to the deleted coal, gas, and oil resources. A major employer in an adjacent district has moved, further adding to the economic problems of the residents. The district consists of small farming operations, with the vast majority of residents commuting, some great distances, to work.

The district's assessed valuation has remained at $48 million since 1985. Although some shift in emphasis has occurred, the teaching staff has remained the same.

The district's administrative staff has remained the same, with the exception that one principal's position was eliminated after occupancy of the new high school. The district level staff consists of a superintendent, federal programs coordinator, one district office secretary, a treasurer, and an assistant to the treasurer.

The superintendent was assisted throughout the project by a board member who had retired from construction and the district's maintenance person.

The planning process began in 1978 when the board decided to apply for building assistance in the next round (1983). The district conducted public meetings, created a citizen's committee that broke into several subcommittees in specific areas, and visited several districts and generally encouraged dialogue between the community and the staff about what the district needed. Vocational supervisors representing the state department visited and participated in some of the discussions. The planning process can best be characterized as board/superintendent driven with input from subcommittees of a citizens committee and the staff.

Several architects were interviewed, along with visits by the administration and board members to some of their current and former projects prior to the final selection. The superintendent was satisfied with the selection process and the architect's performance. The architect was employed prior to the passage of the bond issue and subsequently assisted with the development of materials to assist in the passage of the issue.

The architect and superintendent wrote the educational specifications after several conferences with the staff and community. Additionally, some state department assistance was provided.

The selected site has access to highways, county water, and natural gas. The location also allowed for a centralized sanitation system to be constructed that serves both the new high school and the middle school (old high school). The

site also provides quick access to police, fire, emergency squad and Interstate 70.

The district did not explore construction options and did not take advantage of the latest technology available in HVAC.

The board, superintendent, and faculty reviewed the schematic materials. No outside review or assistance was requested by the district. The same process occurred for the design development phase.

Only the architect assisted the district in selecting the "lowest and best" bids.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The district chose the architect's representative system. However, they negotiated as a part of the architect's fee, more than the normal amount of inspections, often three times per week during the peak construction periods.

The architect and his field representative were responsible for inspecting the construction for compliance with the design and specifications.

A board member, superintendent, and architectural field representative represented the district at all job meetings. Change order requests were reviewed by the architect, the board member, and the superintendent. The architect and the

treasurer reviewed all payment requests.

The maintenance person and all custodians were present during the in-service programs that accompanied the activation process of the various systems.

The final punch list was developed after inspections were made by the architect or his field representative, the principals, teachers, maintenance person, and custodial staff. The superintendent and a board member accompanied the field representative on his inspections.

A dedication ceremony similar to the ground breaking ceremony was held with the same individuals being invited, followed by an open house.

The fixed equipment was selected during the design development phase. Most of the remaining equipment was specified and bid after the construction had begun.

The board, principal, custodians, and teachers developed a successful occupancy plan.

The district did not have a post-construction evaluation and has not established a preventative maintenance program.

District 8

This small southeastern Ohio district constructed a new high school that replaced the former high school. Two buildings are now in use in the district. The ADM has continued to drop (1,127 in 1986 to 1,050 currently). The teaching staff has remained the same, primarily due to lack of funds to add personnel. The area is extremely depressed with high unemployment and 30 percent of the student body

receiving ADC. The district has small farms. The coal mines have closed. Individuals who have jobs must commute out of the district.

A large percent (up to 25 percent) of this small district is tax exempt because it contains part of a state park and a national forest. The assessed valuation has increased from $13 million to $15 million since prior to the construction. Most of this increase has been due to reevaluation and some to limited new construction.

The district's administrative staff remained the same. That structure is one superintendent, three principals, one treasurer, and a bookkeeper/secretary. The superintendent shares a secretary with the high school principal. No one in the district assisted the superintendent in keeping up with the day-to-day progress of the project.

The planning process began in the late seventies when a former superintendent and board started talking about applying for state building assistance. When the district's turn came up on the 1983 list, a community committee, including school employees, organized to pass the bond issue. After the bond issue was passed, the process became board/superintendent driven.

The board interviewed five architects. No visits were made to any school projects developed by these architects, including the finalist.

The architect and administration developed the educational specifications after interviewing the high school

staff. The district did not solicit any outside assistance during the planning phase.

The site that was eventually selected is in the geographic and population center of the district, with excellent access to the major highways in the district. It has good access to fire, police, and ambulance services. The site had preparation costs of $500,000 to bring it above the 100 year high water mark.

The board did not explore any construction options. The HVAC does not provide for any air conditioning options.

The schematic and design development phases were reviewed by the superintendent. The project had to be rebid, because the project came in $1,000,000 over budget on the first bid. (Total available funds was $5.5 million).

Only the architect reviewed the bids, alternates and substitutes while determining the "lowest and best" bids.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

No alternate construction administration was considered. The architect visited the site every Monday for one-half of the day and was responsible for assuring compliance with the design and specifications. The superintendent accompanied the architect to the job meetings and during the site inspections.

The architect reviewed the change orders and payment

requests.

The architect, superintendent, and maintenance custodians were involved when the various mechanical systems were activated.

The superintendent, principal, and the district's maintenance person developed the punch list.

A dedication ceremony similar to the ground breaking ceremony was held with the same individuals being invited, with an open house following.

The built-in equipment for the library and the loose equipment were specified after construction was under way. All other types of equipment were specified during the design development phase.

Teachers, custodians, and the high school principal developed a successful occupancy plan, the move taking less than a week.

A post-construction evaluation of the project involving the superintendent and architect was conducted.

A check-off preventative maintenance program was developed.

The district had to return to the state for $660,000 additional funds to complete the project. The high school has capacity for 150 more students than are currently enrolled (district has experienced declining enrollment).

District 9

This rural eastern Ohio district reduced the number of buildings used from eight to five with the construction of a

high school, three elementary schools, and the renovation of the former high school into a middle school. Staff grew from 130 to 135 teachers, but is now 130 teachers due to declining enrollment and deteriorating financial conditions in the district. The district's ADM has dropped from 2,386 to 2,236 during the past four years. Some of the loss of enrollment can be attributed to the closing of a manufacturing/ distribution center in an adjoining city that employed 5,000 individuals in an adjoining city. The area's economy is depressed, resulting in the county unemployment rate being one of the highest in the state.

However, the assessed valuation has grown from $86 million prior to the construction to $118 million currently. This growth is contributed to spill over into the district of shopping centers, motels, and convenience stores from an adjoining small city, growth around interstate exits, and a new small manufacturing plant that is employing 200 to 300 individuals.

The central office structure has remained the same, except for the addition of a third person in the treasurer's office. This staff consists of a superintendent, an assistant superintendent, two secretaries, a treasurer, and now two assistants. The district has added three principals. Prior to the facilities project, the six elementary schools had head teachers and no principals.

The assistant superintendent helped with the day-to-day monitoring of the project's progress.

The original plan was to build a new high school and the bond issue was passed prior to entering the state building assistance program. After being accepted into the state program, three new elementary schools were added plus the renovation of the former high school into a middle school. The district was assisted by a citizens group during the planning of the high school. Basically, the administration, staff, and architect did the planning for the entire project. The best description of the district's planning process was board/superintendent driven. Three board members with specific interests had tremendous input in the gymnasium (4,000 seating), the auditorium (1,000 seating), and the vocational agriculture area. Almost no planning was made for current or future technologies.

The district conducted an architect search that involved an application, screening process, followed by an interview process. Inspections of former projects were made by the board and administration. The successful architect had previously completed several noneducational projects in the area.

The educational specifications were developed by the architect, with assistance from the administration and the staff. No out of district assistance was sought. The only new ideas came from the staff making visits to new or fairly new schools in the area.

No new sites were selected. However, considerable expense occurred to develop the site where the high school is

located. The new high school, the renovated middle school, and one of the elementaries share a large common site.

No construction options were incorporated in the design of the new facility.

Only the board and administration participated in the review of the schematic and design development phases.

The architect did all the bid reviews and analysis prior to making his recommendations to the board.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

No alternate types of construction administration were reviewed. The architect made all inspections during the one day per week he was on site. He was responsible for inspecting the construction for compliance with the design and specifications. The architect also was responsible for assuring compliance with the design and specifications.

The architect, superintendent, and maintenance supervisor represented the district at job meetings. The superintendent reviewed the change order requests with the architect prior to requesting board approval. The architect reviewed and recommended all payment requests.

The maintenance supervisor and appropriate custodians were involved with the activation of the various systems.

The architect and the superintendent developed the formal punch list.

A dedication ceremony similar to the ground breaking ceremony was held with the same individuals being invited. The program was highlighted by remarks from the State Superintendent of Public Instruction, Dr. Franklin Walter.

Only the fixed equipment was specified during the design development. All other types of equipment were specified, bid, and purchased after the construction was underway. The unknown cost of the remaining equipment caused major financial problems as the project proceeded.

The district staff developed a successful occupancy plan. The administration developed and implemented a well-organized orientation program.

No post-construction evaluation was conducted of the project. One reason may center around the fact that three law suits involving contractors are pending. The dollar value in question is approximately $1.5 million. The key question centers around alleged need for construction changes and delays as a result of alleged deficiencies in the design and specification documents. The project cost $2 million more than originally planned. The cost override could have been higher had money been available for the purchase of loose and fixed equipment in the new elementaries and if new equipment would have been purchased for the renovated middle school.

The district is now starting the process of developing a preventative maintenance program.

District 10

This rural west central Ohio district constructed a new K-12 facility. The district had previously operated 5 buildings. The ADM had been on a slow decline for years. It was 1,034 the year prior to the construction and continued to drop to a low of 988. Currently, the ADM has risen to 1009. The new facilities may have had an influence in stopping this slow decline.

Prior to the project, the teaching staff was 55.5 and it grew to 64.5 as new programs and advanced classes were added to the curriculum. However, the number has been reduced to 54, because the lack of local support for increased operating taxes has resulted in the district entering the state loan fund.

The district's assessed valuation has grown from $42 million to $53 million. Most of this growth was due to reevaluation. A small percent is due to new growth.

Only 6 percent of the district's students receive ADC. The community has a very stable homogenous farming population (60 percent to 70 percent of the residents belong to the Mennonite Church). The district experiences almost no student turn over. Most of the residents' income level falls into the middle income range. The excellent soil types and drainage patterns allow most of the farmers to prosper.

The state building assistance program supplied $6.5 million of this $9.5 million project. The complex, which includes the district's administrative offices, is 154,000 square feet for 1,000 students in a district that does not

expect population growth.

The administrative staff consists of a superintendent, executive secretary, treasurer, assistant treasurer, and two principals, the same as prior and during the construction period.

The maintenance supervisor assisted the superintendent with the day-to-day progress of the project.

The pre-construction planning process involved the board, administration, certified and classified staff, a representative cross section community committee, and the county office. No state department, university, or other type of assistance was used. This combined group helped establish curricular goals for the project, placing special emphasis on college preparation, drama, and music programs. The planning process included a combination of groups that resulted in considerable community input.

The district had retained an architectural firm years prior to this project. The superintendent was satisfied with the architect's work, in spite of the problems that occurred during the construction that resulted in the project costing $400,000 more than originally budgeted. Many completion items had to be eliminated, postponed, or cheapened so the project could be finished.

The educational specifications were developed by the architect and the superintendent. The staff and community committee held numerous conferences with the architect and superintendent as this phase was being completed. The board

reviewed the finished product.

A new site was selected, with the community committee assisting in the selection. Key criteria used to select the site were its centralized location with excellent highway access, utilities, terrain, and acreage for playground and athletic activities.

The district considered several construction options prior to selecting a traditional masonry facility. Building-wide systems for HVAC, security, public address, fire alarm, etc., were installed.

The architect conducted several meetings attended by the board, staff, and community committee during schematic and design development phases. No out-of-district individuals were invited to review these materials.

The district's attorney reviewed the bids and contracts after the architect made his recommendations and prior to their being submitted to the board.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The district chose the architect's field representative method. The field representative was on site 1/2 day per week. The day-to-day supervision was done by the district's maintenance supervisor.

The architect or the field representative was responsible for determining if construction was in compliance

with the design and specifications. The architect and field representative reviewed payment requests.

The architect or his field representative, the maintenance supervisor and superintendent represented the district at the job meetings.

Only the maintenance supervisor or occasionally the architect, or an engineer were present during activation of the HVAC, electrical, etc. systems.

The maintenance supervisor developed the punch list.

A dedication ceremony similar to the ground breaking ceremony was held with the same individuals being invited. The district invited each former graduating class to select a class representative to participate in the dedication ceremony. Prior to the 1962 consolidation of the district, a class representative of both original schools were included. The oldest class representative graduated in 1909.

All equipment except loose equipment was specified during the design development phase. Because of cost overruns, most loose equipment was moved from the existing buildings.

The staff and administration developed a successful occupancy plan.

A post-construction evaluation occurred.

A preventative maintenance program has been instituted (paper and pencil) that involves the HVAC, roof, and other key systems.

District 11

This rural southeastern Ohio district constructed major additions to two elementary schools. Prior to 1985, the district operated fourteen buildings. After the project was completed, this number was reduced to nine buildings and two modular classrooms. The ADM has gone from 1,493 in 1985 to the current level of 1,569. The new facilities have helped the district's image, making the district more attractive for individuals desiring to locate outside the small city that is adjacent to it.

Prior to the project, the district employed 91 teachers. Currently, the district employs 103 teachers. Included in that number is an early childhood-preschool teacher (new program) and a multi-handicapped teacher (new multi-district program).

The district's assessed valuation has grown from $45 million to $56 million since 1985. This growth has occurred as a result of reevaluation, some new growth in residential and some minor growth in Class II property (commercial and industrial). Agricultural land is 48 percent of the assessed valuation.

The unemployment rate is high, especially among the former coal miners, resulting in 25 percent of the student body receiving ADC.

The district office staff has remained the same since prior to the building project, consisting of the superintendent, his secretary, the treasurer, and two assistants in the treasurer's office. Six principals

were employed prior to the construction, five principals now serve the district.

The superintendent had no regular assistance from the administrative staff during the construction period.

The planning process started with a community survey. The PTO, staff, and administration provided direct input to the board, with the district's architect working with this process. The district did not solicit input from any out-of-district sources, with the planning process best described as board/superintendent driven involving input from the staff and the PTO.

During the architect search, the district selected five firms for interviews. The board used a predesigned evaluation sheet which was used to rate these firms. The superintendent followed up this process by visiting school projects of the top candidate.

The superintendent and principals, with input from the elementary staffs and the architect, developed the educational specifications. The classified employees were given the opportunity to provide input. No out-of-district assistance was sought. Materials published by the Council of Educational Facility Planners were extensively used.

The same sites were used.

The district explored various construction options, including portable classrooms. A traditional construction program was selected.

The board used the help from a building and grounds

committee and administration to review the schematic design. Basically, the architect worked alone on the design development phase. The superintendent noted that the construction specifications were poorly developed, which still may lead to a lawsuit against the architect.

The architect did all the bid reviews and analysis prior to making his recommendation to the board.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The board explored the use of a construction manager. Due to financial limitations, the board selected the architect's field representative system.

The architect and the field representative were responsible for assuring that the construction was in compliance with the design and specifications.

The superintendent, a board member, and the two elementary principals whose buildings were involved with additions attended the job meetings on a regular basis.

The architect, treasurer, and superintendent reviewed the change orders and payment requests.

The building principals and custodians were involved with the activation procedures. The architect, superintendent, and the respective building principals developed the punch list.

No dedication ceremony has been held, because the

project ran short of funds and has not been completed. The district is back on the current list and will be able to gain more state assistance to help complete the project if it passes a small bond levy. (The district's indebtedness will have to be taken back up to the 7 percent level.)

The fixed and built-in equipment were specified during the design development phase. Other equipment, such as the kitchen equipment and loose equipment, were specified as the construction was in progress.

The faculty and custodial staff developed a successful occupancy plan.

A post-construction evaluation was conducted with the architect. The State Department of Education did not participate in this process.

The district has developed a flip-card system that schedules and records preventative maintenance activities.

As a final note, this district will not re-employ the same architect for their next project.

District 12

This rural southern Ohio bedroom community constructed a new high school. This facility replaced an old high school, which has now been taken out of service. The district continues to operate three buildings.

The district has not experienced any growth in its assessed valuation ($22.5 million) since the project has been completed. However, real estate agents are indicating that property is now easier to sell to individuals from outside

the district.

The student ADM (900) and teaching staff have remained constant, as has the administrative staff, which consists of a superintendent, executive secretary, treasurer, treasurer's assistant, and three principals.

The district has very little farming or industry. The unemployment rate is high, resulting in 28 percent of the students receiving ADC. The school district is the largest employer in the district. Most residents commute to nearby cities for employment.

The high school principal and head custodian assisted the superintendent with the day-to-day inspection and monitoring of the project.

During the effort to pass the district's bond issue, a community committee assisted the board. This committee sent questionnaires with a stamped return envelope to every resident of the district. The information gathered from this process was used during the campaign, with the issue passing very easily.

After the bond issue was passed, the committee, along with the staff, worked with the architect during the planning phase.

The architect was selected after the project was advertised throughout the region. Interested architects were asked to submit letters of interest. The superintendent developed a questionnaire that was sent to all architects expressing interest in the project. The questionnaire

allowed the board to screen down to seven architects. Two architects from this group were invited to interview with the superintendent and the high school principal. Then, the superintendent and high school principal visited schools designed by the top two architects. References were then checked, especially in the area of litigation involving their projects. The superintendent then made a recommendation to the board which was approved.

The architect wrote the education specifications with input from the staff, high school principal, and superintendent. The high school principal and superintendent took groups of teachers to visit other new facilities. Several state department personnel were asked to provide advice and assistance as the design process was underway. The superintendent attended a Council of Educational Facilities Planners (CEFP) seminar. The Council's "Guide For Planning Educational Facilities" was used extensively.

The board already owned the site where the new school was built.

The board did not seriously explore different construction options. They did insist that the roof be metal with a high pitch. As a result, the facility has several different roof lines. The HVAC system selected required considerable pre-planning as to location and access.

The board or administration did not consult with any outside organization or individuals during the schematic and design development phase. The School Building Assistance

Supervisor was present during the bid opening.

The architect did all the bid reviews and analysis prior to making his recommendation to the board.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

The district considered construction management, but instead, negotiated with the architect to have a field representative on site three half days per week. The superintendent felt this plan provided adequate supervision.

The architect or the field representative was responsible for determining if the construction was in compliance with the design and specifications.

The superintendent feels the architect did an excellent job and has recommended this firm to other districts.

The superintendent, high school principal, and when appropriate, the head custodian accompanied the architect's field representative on inspections and at the job meetings. The architect, superintendent, and board reviewed the change orders. The architect, superintendent and treasurer reviewed the payment request.

During activation procedures, the high school principal and custodian participated. The superintendent, architect, field representative, board, and custodian assisted in developing the punch list. The board had numerous walk throughs during the construction phase.

All equipment except the loose equipment was specified during the design development phase. A local manufacturing company donated all of the science lab tops. The architect included these tops in his design. The superintendent and staff selected the loose equipment during the early part of the construction phase.

The occupancy plan, which was developed by the superintendent, principal, and staff, worked very well.

A post-construction evaluation was conducted.

A checklist preventative maintenance program has been developed involving the architect and administration. This program was developed with the assistance of individuals representing local industrial and businesses. This is not an elaborate program.

District 13

This rural southern Ohio exempted village district built a new 7-12 grade facility, which allows the district to house all students in two building. Three buildings were in use prior to the project, two buildings were taken out of service.

The district's ADM has remained steady at around 1,200 since prior to the beginning of the project. The teaching staff has remained the same with minor course adjustments. The one addition has been a computer instructor.

The assessed valuation has grown from $40 million to the current level of $46 million. The new facility has been a positive influence toward growth in the community. The

residents primarily live on farms or commute to work out of the county.

The district office staff has not changed. This consists of the superintendent, secretary, treasurer, and one assistant treasurer. One principal's position has been eliminated since the completion of the project. The superintendent had no additional assistance with the day-to-day operation of the project.

Several years ago, a feasibility study was made of the old high school. It was determined that cost of renovation would exceed the district's share of a school building assistance program. With this information, a survey was printed in the local weekly newspaper asking if the residents preferred to renovate or build new with state assistance. This survey was followed up with a community meeting. The overwhelming consensus was to build a new high school when the opportunity became available for state assistance through the school building assistance program.

After the bond issue was passed, the planning process can be described as board/superintendent driven with assistance from the architect.

The project was advertised requesting interested architectural firms to send letters of interest. These architects were screened down to four. School facilities were visited prior to interviewing the finalist by the administration and board. The architect selected was not the firm that performed the feasibility study on the old high

school. The superintendent and district have been very satisfied with the services performed by their architect.

The educational specifications were written by the architect with input from the administration and staff. The architect selected all equipment in the project except the loose equipment. The teachers did not visit any new buildings while giving input on the educational specifications. Some limited input came from parents, board, and the state department of education.

The board and superintendent reviewed ten prospective sites prior to reducing that number to two. These two sites were evaluated by an engineering firm. The selected site has direct access to the main transportation pattern, all public utilities, and enough acreage to provide future athletic facility expansion. The village cooperated by constructing sidewalks and curbs to the site.

The district did not explore any construction options. This traditional brick and mortar facility was completed thirteen months after ground was broken.

The board was briefed monthly on the progress of the schematic and design development. The architect determined the "lowest and best" bids.

State and local elected officials, along with representatives from the Ohio Department of Education, participated with the local board in the ground breaking ceremony.

Progress and compliance inspections were made weekly by

the architect's field representative. The board and administration held monthly walk throughs. Their questions and observations were relayed to the architect by the superintendent.

The superintendent, the field representative, and occasionally, a board member attended the job meetings. The architect, superintendent, and treasurer reviewed the change orders and pay requests.

Individuals who would be using (custodians, cooks, etc.) the various systems were invited to participate in the activation procedures.

The field representative and the superintendent developed the final punch list.

All equipment except loose equipment was selected during the design development phase. The loose equipment was selected by the administration after construction was under way.

A successful occupancy plan was developed by the superintendent and high school principal.

The administration and architect conducted a post-construction evaluation.

No formal detailed preventative maintenance program has been developed. However, monthly or periodic activities have been developed that will prolong the life expectancy of key pieces of equipment.

The district is pleased with the project and the services provided by the architectural firm.